



**COMPUTER SCIENCE
BACHELOR PROGRAMME
MODULE HANDBOOK
2023**

Astana IT University, 2023

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1st term

Module name:	Foreign Language 1: English for Academic Purposes																												
Code	IYa 1103																												
Trimester	1																												
Person responsible for the module	Group of instructors																												
Lecturer(s)	A.Ayazbayeva, A.Urazbekova, A.Seidin, Y. Verba, S.Burbekova, N.Ishmukhambetov, K. Hassenov, A.Bakenova, M.Zhenisbayeva, F. Omarova, T.Almas, A. Salkenova, A.Rahimzhanova, S. Zhalmagambetova, A. Musina, M.Smagulova, M. Abzhaparova, M. Amanzhol, A. Smagulova, A. Ichshanova, A.Ormanova																												
Language	English																												
Relation to curriculum	Bachelor programmes: 6B06101 Computer Science 6B06102 Software Engineering 6B06103 Big Data Analysis 6B04101 IT Management																												
Type of teaching	Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																												
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>5</td><td></td><td>50</td><td>10</td><td>90</td><td>150</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	5		50	10	90	150										
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Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td rowspan="2">1st attestation</td><td>Presentation about an IT invention</td><td>10</td><td>Oral defense</td><td>2nd week</td></tr><tr><td>Literature review (5+ sources)</td><td>10</td><td>Oral defense</td><td>4th week</td></tr><tr><td></td><td>Quiz 1 (Textbook + APA)</td><td>10</td><td>Computer based</td><td>5th week</td></tr><tr><td></td><td>1st attestation total</td><td>30</td><td></td><td></td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Presentation about an IT invention	10	Oral defense	2 nd week	Literature review (5+ sources)	10	Oral defense	4th week		Quiz 1 (Textbook + APA)	10	Computer based	5 th week		1 st attestation total	30		
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1 st attestation	Presentation about an IT invention	10	Oral defense	2 nd week																									
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	Quiz 1 (Textbook + APA)	10	Computer based	5 th week																									
	1 st attestation total	30																											

	2nd attestation	Facts and Opinions about an IT invention using APA in-text citations	10	Oral defense	6 th week
		Infomercials about an IT invention	10	Class demonstration with giving peer- feedback	8 th week
		Quiz 2 (Textbook + APA)	10	Computer based	10 th week
		2nd attestation total	30		
	Final Exam: Presentation “My invention”		40	TBA	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100.$				
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Recommended prerequisites	General English				
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • reading and analyzing the structure and content of primary research articles • evaluating the accuracy and reliability of various sources • listening and understanding speaker viewpoints and extension of agreement, both implicit and explicit • listening and analyzing types of supporting evidence: examples, definitions, and explanations • delivering cohesive and coherent presentations • using persuasive language and evidence-based claims to deliver compelling speeches • thinking questions <p>Students will have the skill to:</p> <ul style="list-style-type: none"> • apply critical thinking skills to identify bias in academic texts • take notes from aural input for further study purposes • ask and respond with appropriate syntax and vocabulary to open-ended higher-order thinking questions • interact with peers to give and receive constructive feedback • collect, analyze, and synthesize information from multiple academic sources 				

	<ul style="list-style-type: none"> • write quotations, paraphrases and summaries using APA 7th edition citation style <p>In terms of competences, students will be able to</p> <ul style="list-style-type: none"> • recognize and critically evaluate a range of authentic academic texts • understand and interpret explicit and implicit messages in lectures, presentations, and interviews • communicate fluently and accurately in academic discussions • actively engage in formal discussions using complex sentence structures • draft and provide academic oral presentations • acknowledge, paraphrase, quote sources in APA citation style, 7th edition • use formal and informal language registers in an extended speech • develop public speaking skills • enhance self and peer assessment skills
Content	<p>The course emphasizes active and participatory learning through assignments that require students use their growing academic English skills and critical thinking skills during and outside class hours. The students will enhance their public speaking skills by engaging in increasingly advanced exercises in delivering oral presentations, both spontaneous and prepared. The course This Syllabus is developed in accordance with the aims and learning outcomes of the BA degrees in Computer Science, Software Engineering, Big Data Analysis, Media Technologies, Mathematical and Computational Science, Cyber Security, Smart Technologies, Digital Journalism, IT Management, IT Entrepreneurship, Digital Public Administration and Services, Industrial Internet of Thing, so that the students can successfully apply their knowledge and skills gained in the course in other subjects, demonstrate their academic English language competence, and successfully accomplish the Astana IT University coursework assignments.</p>
Media employed	<p>Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.</p>
Reading list	<p><i>Main literature:</i> De Chazal, E., & McCarter, S. (2015). Oxford EAP. A Course in English for Academic Purposes. Upper-intermediate / B2. The textbook is on Moodle/Microsoft Teams. The audio and video materials are available at https://elt.oup.com/student/oxfordeap/b2?cc=kz&selLanguage=en oxfordlearnersbookshelf.com Oxford EAP B2 - 270785388838</p> <p><i>Recommended literature:</i> Coursera course: Speaking so that people listen. Language instructors will weekly post additional sources such as readings, PowerPoint presentations, and website links on Moodle.</p>

Module name:	History of Kazakhstan
Code	
Trimester	1
Person responsible for the module	Assoc. Prof. N. Shayakhmet
Lecturer(s)	Assoc. Prof. S. Mamytova Assoc. Prof. Zh. Zhampeissova Assoc. Prof. A. Auzhanova

	Assoc. Prof. K. Battalov																									
Language	English																									
Relation to curriculum	Bachelor programmes: all specialties																									
Type of teaching	The lectures serve to introduce students to the theoretical and methodological basis of the course and new concepts on the history of Kazakhstan. Seminar sessions are aimed at developing the skills of analytical and axiological analysis in the study of events, processes and phenomena in the history of Kazakhstan. Instructor-supervised independent study (ISIS) involves a deeper study of course materials. Student’s independent study (SIS): self-study time, including the time required to prepare and complete all course assignments.																									
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Course assessment and forms of examination	<table><tr><th>Period</th><th>Assignments</th><th>Number of points</th><th>Total</th></tr><tr><td>1st attestation</td><td>- Listening to the lectures and answering the test tasks - 4 points (1-5 weeks=20) - Activity on seminar sessions 1 -Activity on seminar sessions 2 -Activity on seminar sessions 3 -Activity on seminar sessions 4 Mid Term: preparation and defense of the media presentation (research project) on a chosen topic (1-5 weeks) – 40 % Attendance – at least 70%</td><td>20 10 10 10 10 40</td><td>100</td></tr><tr><td>2nd attestation</td><td>- Listening to the lectures and answering the test tasks - 4 points (6-10 weeks=20) - Activity on seminar sessions 6 -Activity on seminar sessions 7 -Activity on seminar sessions 8 -Activity on seminar sessions 9 End Term: preparation and defense of the media presentation (research project) on a chosen topic (6-10 weeks) – 40 % Attendance – at least 70%</td><td>20 10 10 10 10 40</td><td>100</td></tr><tr><td>Final exam*</td><td>State examination (multiple choice test)</td><td></td><td>100</td></tr><tr><td>Total</td><td>0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final</td><td></td><td>100</td></tr></table>						Period	Assignments	Number of points	Total	1 st attestation	- Listening to the lectures and answering the test tasks - 4 points (1-5 weeks=20) - Activity on seminar sessions 1 -Activity on seminar sessions 2 -Activity on seminar sessions 3 -Activity on seminar sessions 4 Mid Term: preparation and defense of the media presentation (research project) on a chosen topic (1-5 weeks) – 40 % Attendance – at least 70%	20 10 10 10 10 40	100	2 nd attestation	- Listening to the lectures and answering the test tasks - 4 points (6-10 weeks=20) - Activity on seminar sessions 6 -Activity on seminar sessions 7 -Activity on seminar sessions 8 -Activity on seminar sessions 9 End Term: preparation and defense of the media presentation (research project) on a chosen topic (6-10 weeks) – 40 % Attendance – at least 70%	20 10 10 10 10 40	100	Final exam*	State examination (multiple choice test)		100	Total	0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final		100
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	Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	World History, Geography
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> - Know and understand the main stages in the development of the history of Kazakhstan; - Correlation of the phenomena and events of the historical past with the general paradigm of the world-historical development of human society through critical analysis; <p>Students will have the skill to:</p> <ul style="list-style-type: none"> - have the skills of analytical and axiological analysis in the study of historical processes and phenomena of modern Kazakhstan; - be able to objectively and comprehensively comprehend the immanent features of the modern Kazakh model of development; <p>In terms of Competences, students will be able:</p> <ul style="list-style-type: none"> - to systematize and give a critical assessment of historical phenomena and processes in the history of Kazakhstan.
Content	The course content consists of 5 thematic blocks: ancient people and the formation of a nomadic civilization, Turkic civilization and the Great Steppe, Kazakhstan in modern times (XVIII - early XX centuries), Kazakhstan in the Soviet period, Independent Kazakhstan.
Media employed	Multimedia classrooms equipped with computer, and projection; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. History of Kazakhstan (Қазақ Елі): A 4-volume set of textbooks. Books 1-4 / T.Omarbekov, B.Karibaev, N.Nurtazina [et al.].— Almaty: Qazaq University, 2021 2. Исмагулов О., Исмагулова А. Происхождение казахского народа. По данным физической антропологии. Алматы, 2017. — 196 с. 3. Кәрібаев Б.Б. Қазақ хандығының құрылу тарихы. — Алматы: «Сардар» баспа үйі, 2014. — 520 б. <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. Formation and development of present statehood of Kazakhstan. Foundation of the First President of the Republic of Kazakhstan – Elbasy. Nur-Sultan, 2019 2. Yuval Noah Harari (2014), Sapiens: A Brief History of Humankind. 3. M. Olcott (1996), The Kazakhs, The Stanford University.

Module name:	Linear Algebra
Code	
Trimester	1 for Software Engineering, Big Data Analysis, Computer Science, IT Management
Person responsible for the module	Assoc. Prof. M. Sergaziyev, PhD
Lecturer(s)	Syndar Satbayev M. Sergaziyev
Language	English
Relation to curriculum	Bachelor programmes: Media Technology, IT, Compulsory course.

Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																																					
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Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.																																																					
Requirements according to the examination regulations	The offline final exam for the course “Linear Algebra” includes theoretical and practical tasks for 80 minutes. The online final exam for the course “Linear Algebra” includes twenty theoretical and practical multiple-choice tasks for 80 minutes. Students will be given multichoice tasks in LMS and must give their answers by choosing one variant. At the completion of the exam, all works must be submitted in the Learning Management System (moodle.astanait.edu.kz). No late submissions are allowed in the exam																																																					
Recommended prerequisites	Linear Algebra, Calculus I, Calculus II, Discrete mathematics.																																																					

Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> - To demonstrate knowledge of mathematical knowledge - To understand basic mathematical principles (proving, counting) - To solve counting problems using different enumeration methods - To understand fundamental properties of matrices including determinants, inverse matrices, matrix factorizations, eigenvalues, and linear transformations. Solve systems of linear equations. - To develop mathematical abilities in writing programs by computers. <p>Students will know how to</p> <ul style="list-style-type: none"> - Ability to write mathematical statements and problem solutions using mathematical symbols. - Understanding of key mathematical concepts and the application of appropriate tools to real problems. - Writing logical progressions of precise mathematical statements to justify and communicate your reasoning. <p>By the end of the course the student will be expected to be able to:</p> <ol style="list-style-type: none"> 1) understand types of solutions of systems of linear equations and present them in different forms 2) compute the inverse of a matrix 3) be able to construct the matrix of a linear transformation in given basis 4) determine the dimension of a subspace and the rank of a matrix 5) compute determinants 6) know how to find null spaces and column spaces of matrices 7) know how to find eigenvalues and corresponding eigenvectors 8) perform the diagonalization of a matrix
Content	<p>In a course on Linear Algebra, students will explore topics such as vectors, matrices, vector spaces, linear independence, basis and dimension, linear transformations, eigenvalues and eigenvectors, and inner product spaces. They will learn how to perform operations on vectors and matrices, including addition, scalar multiplication, dot product, cross product, matrix multiplication, and matrix inverses.</p> <p>Students will develop an understanding of the fundamental concepts and properties of linear algebra and learn to apply them to solve various problems. They will learn techniques for solving systems of linear equations, finding solutions to homogeneous and nonhomogeneous systems, and determining the consistency and uniqueness of solutions.</p> <p>The course will also cover topics related to vector spaces, including subspaces, spanning sets, linear dependence and independence, and basis and dimension. Students will explore the concept of linear transformations and their properties, such as injectivity, surjectivity, and invertibility.</p> <p>Eigenvalues and eigenvectors will be studied in detail, including their geometric interpretations and applications in diagonalization and solving systems of linear differential equations.</p> <p>Throughout the course, students will develop their problem-solving and critical-thinking skills by working on exercises and applications that involve real-world scenarios. They will also use computational tools and software, such as MATLAB or Python libraries, to perform calculations and visualize concepts in linear algebra.</p> <p>Overall, a course in Linear Algebra provides students with a solid foundation in mathematical techniques and concepts that are widely applicable in various fields, including mathematics, engineering, computer science, physics, economics, and data science.</p>
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.

Reading list	<p>Assigned reading materials and presentations should be read prior to class. Class lectures and discussions will proceed with supplemental and advanced topics, which could be difficult to understand unless students have read the assigned material. Readings are listed in the schedule section. All necessary updates and / or changes to the course will be reflected in the Learning Management System (moodle.astanait.edu.kz).</p> <p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Lecture presentations 2. David C. Lay, Steven R. Lay and Judi J. McDonald, Linear Algebra and Its Applications, 5th edition, 2016 3. George B. Thomas and Ross L. Finney, Calculus and Analytic Geometry, 9th Edition, 1998 <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. Introduction to linear Algebra. Gilbert Strang 2. Linear Algebra and Its Applications, by Gilbert Strang, 4th Edition 3. Beklemishev D.V. The Course in Analytical Geometry and Linear Algebra. Moscow: Nauka, 2012.
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Module name:	Information Communication Technologies																		
Code																			
Trimester	1																		
Person responsible for the module	Senior lecturer E. Aitmukhanbetova, M.Sc.																		
Lecturer(s)	Zh.Sarsenova, M.Sc. M.Yermaganbetova, PhD																		
Language	English																		
Relation to curriculum	Bachelor programmes: Big Data Analysis, Software Engineering, IT Management. Compulsory course.																		
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions are active sessions to develop student’s confidence through discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																		
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Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td>1st attestation</td><td>Report Proposal</td><td>20</td><td>Submission of written reports</td><td>2nd week</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Report Proposal	20	Submission of written reports	2 nd week				
Period	Assessment type	Number of points	Exam Form	Schedule (Week #)															
1 st attestation	Report Proposal	20	Submission of written reports	2 nd week															

		Quiz 1	15	Test	3 rd week
		Quiz 2	15	Test	4 th week
		Weekly quizzes on learn.astanait	10	Online test	weekly
		Mid-term Exam	40	Submission of written reports	5 th week
		1st attestation total	100		
	2nd attestation	Project plan	15	Submission of written reports	6 th week
		Quiz 3	15	Test	7 th week
		Weekly quizzes on learn.astanait	10	Online test	weekly
		Milestone 1	20	Submission of written reports	8 th week
		End-term Exam	40	Test	10 th week
		2nd attestation total	100		
	Final Exam		100	Project Defence	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100.$				
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Recommended prerequisites	No prerequisites				
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • Computer systems; system concepts and architecture; • Software and operating Systems; human-Computer Interaction • Networks and Telecommunications; network Models; • Internet technologies, cloud and mobile technologies; • Database systems, data models; • Cybersecurity, cybercrime, common threats; • Multimedia technologies; • Smart technology, IoT, data analysis. <p>Students will have the skill to</p> <ul style="list-style-type: none"> • to understand the roles of ICT, and to differentiate computer systems and its subsystems; • to explain the purpose, content, and development trends of information and communication technologies, justify the choice of the most appropriate technology for solving specific problems; • to understand methods of collecting, storing, and processing information, 				

	<p>ways of implementing information and communication processes;</p> <ul style="list-style-type: none"> to use Internet resources, cloud, and mobile services to search, store, process, and distribute information; <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> to master modern computer technology and modern software for the definite task; to acquire the ability to work in the global Internet; to acquire skills of acquisition, analysis and processing of various types of information; to create project activities in the specialty using modern information and communication technologies. to acquire skills in work with academic, special and periodical literature in the field of information technology.
Content	<p>This course is developed to learn the introduction to ICT and the idea of computer systems; to obtain understanding of computer systems, cybersecurity, smart technologies, human-computer interaction. Students acquire the concepts of relational databases, computer networks, cloud technologies, and gain extensive practical experience working on a project. In addition to the practical purpose, this course provides academic and educational purposes, helping to expand the horizons of students, improve their general culture and education.</p>
Media employed	<p>Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.</p>
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> Lecture notes (available on http://moodle.astanait.edu.kz) June J. Parsons, New Perspectives on Computer Concepts 18th Edition—Comprehensive, Thomson Course Technology, a division of Thomson Learning, Inc Cambridge, MA, 2016. Reema Thareja, Fundamentals of Computers. – Oxford University press: Oxford, 2014. Information Communication Technologies (ISBN-978-601-7911-03-4, published by IITU, Almaty 2017). <p>Supplementary literature: Online journals and articles.</p>

Module name:	Introudction to programming (C++)
Code	
Trimester	1
Person responsible for the module	M.Sc Nursultan Khaimuldin
Lecturer(s)	Askar Khaimuldin, M.Sc. Aigerim Aibatbek, M.Sc. Nurlan Karimzhan MSIT

	Sayatbek Orazbekov M.Sc. Gulnara Mussina M.Sc.																																													
Language	English																																													
Relation to curriculum	Bachelor programmes: Big Data Analysis, Software Engineering, IT Management, Computer Science, Cyber Security, Media Technologies, Telecommunication Systems, Smart Technologies. Compulsory course.																																													
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																													
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>5</td><td>20</td><td>30</td><td>10</td><td>90</td><td>150</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	5	20	30	10	90	150																											
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5	20	30	10	90	150																																									
Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td rowspan="3">1st attestation</td><td>Contester problem set</td><td>60</td><td>Submission of written reports</td><td>Weekly</td></tr><tr><td>Mid-term Exam</td><td>40</td><td>MCQ and Practical exam</td><td>5th week</td></tr><tr><td>1st attestation total</td><td>100</td><td></td><td></td></tr><tr><td rowspan="3">2nd attestation</td><td>Contester problem set</td><td>60</td><td>Submission of written reports</td><td>Weekly</td></tr><tr><td>End-term Exam</td><td>40</td><td>MCQ and Practical exam</td><td>10th week</td></tr><tr><td>2nd attestation total</td><td>100</td><td></td><td></td></tr><tr><td colspan="2">Final Exam</td><td>100</td><td>MCQ</td><td>During final exam session</td></tr><tr><td colspan="5">Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final = 100.</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Contester problem set	60	Submission of written reports	Weekly	Mid-term Exam	40	MCQ and Practical exam	5 th week	1st attestation total	100			2nd attestation	Contester problem set	60	Submission of written reports	Weekly	End-term Exam	40	MCQ and Practical exam	10 th week	2nd attestation total	100			Final Exam		100	MCQ	During final exam session	Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.				
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Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.																																													

Recommended prerequisites	Linear Algebra, Calculus I, Calculus II, Discrete mathematics.
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • To demonstrate knowledge of C++ syntax • To understand basic programming principles • To solve programming problems using C++; • To apply elementary techniques involving arithmetic operators, mathematical and logic expressions in C++ programming • To develop C++ programs that use sequential files for input and output. <p>Students will have the skill to</p> <ul style="list-style-type: none"> • program with basic features of the C++ programming language • write C++ programs that use selection (if, switch, ternary operator) • write C++ programs that use loops (while, do-while, for) • understand basic use of arrays in C++ programming • understand functions in C++ programming • understand the concept of pointers in C++ programming • understand the usage of structs <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • program with basic features of the C++ programming language • write C++ programs that use selection (if, switch, ternary operator) • write C++ programs that use loops (while, do-while, for) • understand basic use of arrays in C++ programming • understand functions in C++ programming • understand the concept of pointers in C++ programming • understand the usage of structs
Content	This course is developed to learn programming fundamentals and writing algorithms in C++ programming language. During this course, you will improve your programming skills, writing simple algorithms using C++ technologies.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Lecture notes (available on moodle.astanait.edu.kz) 2. Paul & Harvey Deitel - C++ How to Program, 10th edition 3. Herbert Schildt. 2003. The Complete Reference C++, 4th edition. <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. http://contester.astanait.edu.kz:31001/ 2. https://cplusplus.com/

Module name:	Physical Education
Code	
Trimester	1,2,3,4
Person responsible for the module	Senior lector N. Shayakhmetov, master of pedagogical sciences Senior lector S. Askapov Teacher E. Zhanabekov Teacher S. Sadvokassova, master of pedagogical sciences
Instructors	N. Shayakhmetov, Master of pedagogical sciences S. Askapov E. Zhanabekov

	S. Sadvokassova, Master of pedagogical sciences																																																								
Language	English																																																								
Relation to curriculum	Bachelor programmes: all educational programs																																																								
Type of teaching	Practice sessions formation of social and personal competencies of students and the ability to purposefully use the means and methods of physical culture, ensuring the preservation, strengthening of health to prepare for professional activities; to the persistent transfer of physical exertion, neuropsychic stress and adverse factors in future work. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																																								
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>8</td><td>-</td><td>80</td><td>-</td><td>160</td><td>240</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	8	-	80	-	160	240																																						
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Period	Assessment type	Number of points	Exam Form	Schedule (Week #)																																																					
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Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.																																																								

Recommended prerequisites	Not required
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> values of physical culture and sports; the importance of physical condition of the body in human life; factors that determine human health, the concept of a healthy image life and its components; principles and patterns of physical education; ways to monitor and evaluate physical state of the body; methodological foundations of physical education, foundations self-improvement of physical qualities and personality traits; <p>the influence of the conditions and nature of the work of a specialist on the choice of the content of industrial physical culture aimed at increasing in labor productivity.</p> <p>Students will have the skill to</p> <ul style="list-style-type: none"> adhere to a healthy lifestyle; independently maintain and develop basic physical quality in the process of physical exercises; select necessary applied physical exercises to adapt the body to various working conditions and specific environmental influences. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> apply various modern concepts in the field of physical culture; use methods and methods of self-diagnosis, self-assessment, means health improvement for self-correction of health by various forms of motor activities that satisfy human needs in a rational use of free time; use methods of selecting a set of physical exercises for health promotion; use means and methods of applied physical trainings for endurance, speed, strength, flexibility and agility
Content	<p>The content of the program is based on the following conceptual positions:</p> <ul style="list-style-type: none"> general educational orientation of the process of physical education; consistency of the educational process; professional and applied orientation of physical education; normative and methodological provision of education of students in the field of physical culture and sports;
Media employed	<p>Youtube:</p> <p>Nike training</p> <p>Home workout</p> <p>Online journals, article, papers, books and internet resources</p>
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> "Theory and methods of physical education and sports: Moscow 2003" Zh.K. Kholodov, V.S. Kuznetsov Dene mädenieti men sporttyn ilimi men adistemesi. -Oskemen, ShQMU baspasy. 2009 Uanbaev E.K., Uanbaeva F.Zh. Sports theory: Oqu qyraly. - Pavlodar: PMPI, 2013. - 192 p. J.A. Usin, A.M. Mamytov, S.N. Askapov <p>Supplementary literature:</p> <ol style="list-style-type: none"> The system of training athletes in Olympic sports: Moscow 2004: 820 st. Platonov V.N.

Module name:	Educational Practice																		
Code																			
Trimester																			
Person responsible for the module	Teacher B. Azibek, MSc																		
Lecturer(s)	B. Azibek, MSc A. Yerassyl, MSc.																		
Language	English																		
Relation to curriculum	Compulsory course.																		
Type of teaching	Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																		
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>2</td><td>0</td><td>0</td><td>120</td><td>40</td><td>60</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	2	0	0	120	40	60
ECTS credits	Contact hours		ISIS	SIS	Total hours														
	Lectures	Practice sessions																	
2	0	0	120	40	60														
Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td>Attestation</td><td>A report with all the material (done tasks) learned during the educational practice</td><td>100</td><td>Report</td><td>At the end of educational practice</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	Attestation	A report with all the material (done tasks) learned during the educational practice	100	Report	At the end of educational practice				
Period	Assessment type	Number of points	Exam Form	Schedule (Week #)															
Attestation	A report with all the material (done tasks) learned during the educational practice	100	Report	At the end of educational practice															
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.																		
Recommended prerequisites	No prerequisites																		
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none">to explain the practical principles of information and communication technologies;to learn how to code (program) the algorithms for various real-world problems;to understand how to apply knowledge and skills to provide project work. <p>The skills will be achieved after the educational practice include but are not</p>																		

	<p>limited to understanding of practical applications of many information technology concepts and approaches</p> <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> To understand the practical fundamentals of many information technology concepts and approaches, including programming concepts.
Content	The educational practice is a short two-week course where the main idea is to give students the practical knowledge of programming and the opportunity to make real projects. During educational practice, each group of students is allocated active hours with teachers (heads of educational practice) for two weeks of educational practice
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	No special readings needed

Term 2

Module name:	Foreign Language 2: English for Academic Purposes																		
Code	IYa 1103																		
Trimester	2																		
Person responsible for the module	Group of instructors																		
Lecturer(s)	A.Ichshanova, A.Ayazbayeva, A.Urazbekova, A.Seidin, Y. Verba, S.Burbekova, N.Ishmukhambetov, K. Hassenov, A.Bakenova, M.Zhenisbayeva, F.Tolesh, F. Omarova, T.Almas, A. Salkenova, A.Rahimzhanova, S. Zhalmagambetova, A. Musina, M.Smagulova, M. Abzhaparova, M. Amanzhol, A. Bakenova, A. Ormanova																		
Language	English																		
Relation to curriculum	Bachelor programmes: 6B06101 Computer Science 6B06102 Software Engineering 6B06103 Big Data Analysis 6B04101 IT Management																		
Type of teaching	<p>Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																		
Workload of course components and credits per trimester	<table border="1"> <tr> <th rowspan="2">ECTS credits</th><th colspan="2">Contact hours</th><th rowspan="2">ISIS</th><th rowspan="2">SIS</th><th rowspan="2">Total hours</th></tr> <tr> <th>Lectures</th><th>Practice sessions</th></tr> <tr> <td>5</td><td></td><td>50</td><td>10</td><td>90</td><td>150</td></tr> </table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	5		50	10	90	150
ECTS credits	Contact hours		ISIS	SIS	Total hours														
	Lectures	Practice sessions																	
5		50	10	90	150														

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1 st attestation	Syllabus Quiz	2	Computer based	1 st week
		APA in-text citation Quiz	5	Computer based	2 nd week
		Paraphrasing and Summarising activity	8	Oral defense	3 rd week
		Introduction structure Quiz	5	Computer based	4 th week
		Midterm Grammar – Vocabulary Quiz	10	Computer based	5 th week
		1st attestation total	30		
	2nd attestation	Writing an evidence-based problem or solution paragraph	5	Submission of written work	6 th week
		In-class group presentation “Dos and don’ts of academic writing.	5	Oral defense	7 th week
		Paragraph and conclusion structure quiz	5	Computer based	8 th week
		APA referencing Quiz	5	Computer based	9 th week
		Endterm Grammar-Vocabulary Quiz	10	Computer based	10 th week
		2nd attestation total	30		
	Final Exam		40	Computer based quiz	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100.$				
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				

Recommended prerequisites	Foreign Language 1: English for academic purposes
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> ● developing writing and reading abilities in a variety of academic settings ● developing listening and speaking skills through lectures, seminars and presentations within a university context <p>Students will have the skill to:</p> <ul style="list-style-type: none"> ● follow a range of formal and informal discussions in academic contexts ● follow lectures and presentations ● take notes from aural input for further study purposes ● participate in formal and informal classroom discussions and conversations ● ask and respond with appropriate syntax and vocabulary to open-ended higher-order thinking questions ● Interact with peers to give and receive constructive feedback <p>In terms of competences, students will be able to</p> <ul style="list-style-type: none"> ● apply critical reading skills ● write summaries of academic literature ● know the key components of an academic essay ● how to construct an effective thesis statement ● how to build clear topic sentences ● how to paraphrase and how to conclude essays
Content	English for Academic Purposes is designed to help students focus on basic skills in academic writing, reading, listening and speaking with an emphasis on the rules of academic English style, research and academic vocabulary and academic language use. The course is developed in accordance with the aims and learning outcomes of the educational requirements of the BA degrees in Computer Science, Software Engineering, Big Data Analysis, Media Technologies, Mathematical and Computational Science, Cyber Security, Smart Technologies, Digital Journalism, IT Management, IT Entrepreneurship, Digital Public Administration and Services, Industrial Internet of Thing, so that the students can successfully apply their knowledge and skills gained in the course in other subjects, demonstrate their academic English language competence, and successfully accomplish the Astana IT University coursework assignments.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p><u>Main literature:</u></p> <ol style="list-style-type: none"> 1. De Chazal, E., & Moore, J. (2021). <i>Oxford EAP: A Course in English for Academic Purposes</i>. Advanced/C1. Oxford University Press. 2. The audio and video materials are available at https://elt.oup.com/student/oxfordeap/c1?cc=kz&selLanguage=en 3. Paterson, K. (2017). <i>Oxford Grammar for EAP</i>. London: Oxford University Press. <p><u>Supplementary literature:</u></p> <ol style="list-style-type: none"> 4. Bailey, S. (2018). <i>Academic Writing: A Handbook for International Students</i> (5th ed.). Routledge. 5. Language instructors will weekly post additional sources such as readings, PowerPoint presentations, and website links on Moodle

Module name:	Second foreign language-Chinese language
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Code	IYa 1103																																							
Trimesters	1-2																																							
Person responsible for the module	Senior-lecturer, Master of pedagogical sciences Musina A.O																																							
Lecturer(s)	A.Musina, M.Sc.																																							
Language	Chinese																																							
Relation to curriculum	Bachelor programmes: 6B06101 Computer Science 6B06102 Software Engineering 6B06103 Big Data Analysis 6B06105 Media Technologies 6B06106 Mathematical and Computational Science 6B06301 Cyber Security 6B06202 Smart Technologies 6B03201 Digital Journalism 6B04101 IT Management 6B04102 IT Entrepreneurship 6B04103 Digital public administration and services 6B07101 Industrial Internet of Things Elective course																																							
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																																							
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>10</td><td>-</td><td>100</td><td>20</td><td>180</td><td>300</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	10	-	100	20	180	300																					
ECTS credits	Contact hours		ISIS	SIS	Total hours																																			
	Lectures	Practice sessions																																						
10	-	100	20	180	300																																			
Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td rowspan="4">1st attestation</td><td>Assignment 1</td><td>30</td><td>Submission of written work</td><td>Weekly</td></tr><tr><td>Assignment 2</td><td>30</td><td>Written</td><td>3rd week</td></tr><tr><td>Mid-term Exam</td><td>40</td><td>Written</td><td>5th week</td></tr><tr><td>1st attestation total</td><td>100</td><td></td><td></td></tr><tr><td rowspan="3">2nd attestation</td><td>Assignment 3</td><td>30</td><td>Submission of written work, text and essay on the certain topic</td><td>Weekly</td></tr><tr><td>Assignment 4</td><td>30</td><td>Written</td><td>8th week</td></tr><tr><td>End-term Exam</td><td>40</td><td>Written</td><td>10th week</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Assignment 1	30	Submission of written work	Weekly	Assignment 2	30	Written	3 rd week	Mid-term Exam	40	Written	5 th week	1st attestation total	100			2nd attestation	Assignment 3	30	Submission of written work, text and essay on the certain topic	Weekly	Assignment 4	30	Written	8 th week	End-term Exam	40	Written	10 th week
Period	Assessment type	Number of points	Exam Form	Schedule (Week #)																																				
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	Assignment 2	30	Written	3 rd week																																				
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	End-term Exam	40	Written	10 th week																																				

		2nd attestation total	100		
	Final Exam		100	Mixed format	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100$.				
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Recommended prerequisites	Foreign language 1 and 2				
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ol style="list-style-type: none"> 1. improving the reading technique for the pinyin transcription and hieroglyphs 2. recognizing meaningful phonemes, rhythmic patterns, phrases 3. understanding dialogues and video materials 4. understanding the main content of texts <p>Students will have the skill to:</p> <ol style="list-style-type: none"> 1. write hieroglyphs 2. compose and analyze the structure of the hieroglyph, to determine the key blocks of hieroglyphs 3. compose a written message of different volume and content within the studied topics 4. write composition, short essay, interactive dialogues etc. 5. develop vocabulary and sentence structure 6. use in everyday situations through various forms of oral practice 7. express themselves with the right words and phrases 8. read and write short paragraphs <p>In terms of competences, students will be able to:</p> <ol style="list-style-type: none"> 1. understand basic communication 2. develop communicative skills 3. use oral and written Chinese at the beginner level. 4. acquire new vocabulary consolidated through conversation stressing the relationship 5. between language and culture 				
Content	Chinese Language is designed to help students focus on basic skills in listening, reading, writing and speaking with an emphasis on the rules of simplified Chinese. This course is developed in accordance with the BA degree in Smart Technologies, IT Entrepreneurship, Computer Science, Telecommunication Systems, Cybersecurity, IT Management, Digital Journalism, Media Technology, Big Data, Software Engineering and Industrial Automation Program aims and learning outcomes.				
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.				
Reading list	<i>Main:</i> Practical course of Chinese language. In 2 volumes. 2 volumes Alexander Fedorovich Kondrashevsky				

	<p>Eastern book publishing house, 2018 ISBN 978-5-907086-04-3</p> <p>Сирко Е.В. (2006). 北京语言大学出版社, 新使用汉语课本1课本</p> <p>Сирко Е.В. (2006). 北京语言大学出版社, 新使用汉语课本1课本 exercise book</p> <p>Recommended:</p> <p>Teaching manual of Chinese for students of non-linguistic specialties (1st year), 2021, Musina A.O.</p>
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Module name:	German language A1.2																																					
Code																																						
Trimester	1 and 2																																					
Person responsible for the module	A. Baizhanova, MSc																																					
Lecturer(s)	Baizhanova, MSc.																																					
Language	English, German																																					
Relation to curriculum	6B06101 - Computer Science; 6B06102 – Software Engineering; 6B06103 – Big Data Analysis; 6B04101 - IT Management. Non-compulsory course.																																					
Type of teaching	Lectures serve to introduce new grammar topics and vocabulary. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the topics. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																					
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>10</td><td></td><td>100</td><td>20</td><td>180</td><td>300</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	10		100	20	180	300																			
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	Lectures	Practice sessions																																				
10		100	20	180	300																																	
Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td rowspan="2">1st attestation</td><td>Projekt 1. Mein Tag</td><td>20</td><td>Submission and defense of presentation</td><td>5th week</td></tr><tr><td>Quiz</td><td>10</td><td>Written</td><td>5th week</td></tr><tr><td rowspan="2">2nd attestation</td><td>Projekt 2. Mein Lieblingsfest</td><td>20</td><td>Submission and defense of presentation</td><td>10th week</td></tr><tr><td>Quiz</td><td>10</td><td>Written</td><td>10th week</td></tr><tr><td colspan="2">Final Exam</td><td>40</td><td>Oral</td><td>During final exam session</td></tr><tr><td colspan="5"></td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Projekt 1. Mein Tag	20	Submission and defense of presentation	5 th week	Quiz	10	Written	5 th week	2nd attestation	Projekt 2. Mein Lieblingsfest	20	Submission and defense of presentation	10 th week	Quiz	10	Written	10 th week	Final Exam		40	Oral	During final exam session					
Period	Assessment type	Number of points	Exam Form	Schedule (Week #)																																		
1 st attestation	Projekt 1. Mein Tag	20	Submission and defense of presentation	5 th week																																		
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2nd attestation	Projekt 2. Mein Lieblingsfest	20	Submission and defense of presentation	10 th week																																		
	Quiz	10	Written	10 th week																																		
Final Exam		40	Oral	During final exam session																																		

	Cumulative total for the course = $0,3 * 1st\ Att + 0,3 * 2nd\ Att + 0,4 * Final$.
Requirements according to the examination regulations	<p>Course and university policies include:</p> <p>Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).</p> <p>Late submissions are not accepted.</p> <p>No cheating, duplication, falsification of data, plagiarism, and crib</p> <p>Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>
Recommended prerequisites	German language A1.1
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> - rules for reading, pronunciation and writing of vowels, consonants and letter combinations; - the lexical side of speech in the volume of levels A1.2 (including both stylistically neutral lexical units and elements of everyday colloquial speech) ; - the main grammatical structures characteristic of oral and written speech of everyday communication (at level A1.2). <p>Students will have the skill to:</p> <ul style="list-style-type: none"> - understand individual phrases and frequently used vocabulary, in statements on topics related directly to the student (for example, basic personal and family data, shopping, place of residence, work); - understand the main points in short, clear and simple messages and announcements. - read and understand the content of short, simple texts; - find specific, easily predictable information in simple texts of everyday communication: in advertisements, brochures, menus, schedules, announcements; - understand short, simple letters of a personal nature; - communicate in simple typical situations that require a direct exchange of information within the framework of familiar topics and activities; - use simple phrases and sentences, talk about their family and other people, living conditions, studies, daily activities in the form of a series of short simple phrases and sentences in the form of a list. <p>In terms of competences, students will be able to:</p> <ul style="list-style-type: none"> - use the basics of writing (recording information, making a plan, making notes); - conduct everyday correspondence; - deliver a public speech (to form an oral message, a monologue, to make a report, a presentation); dialogical speech (to implement a basic communication).
Content	German Language A1.2 is designed to prepare students to use German for their needs and interests in real-life situations and work. Additionally, this course will further give the students the possibility to communicate on general social topics, free communication in English speaking environment and understanding texts of general use. Much emphasis is placed on speaking, reading and writing skills and on the projects to represent the learners' achievement.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.

Reading list	Basic Literature: Niebisch, D., Penning-Hiemstra, S., Specht, F., Bovermann, M., Pude, A., Reimann, M. (2022). Hueber Verlag. Schritte International Neu. A1.2. The textbook is on Moodle/Microsoft Teams.
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Module name:	Cultural Studies																																			
Code																																				
Trimester	2																																			
Person responsible for the module	Assoc. Prof. A. Uyzbayeva, PhD																																			
Lecturer(s)	Assoc. Prof. A. Uyzbayeva, PhD Assistant professor, A. Rakhimzhanova, PhD																																			
Language	English																																			
Relation to curriculum	Bachelor programmes: History of Kazakhstan, Philosophy. Compulsory course.																																			
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																			
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>2</td><td>10</td><td>10</td><td>10</td><td>30</td><td>60</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	2	10	10	10	30	60																	
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2	10	10	10	30	60																															
Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td rowspan="5">1st attestation</td><td>Oral presentation</td><td>30</td><td>Oral defence</td><td>3rd week</td></tr><tr><td>Online game</td><td>30</td><td>Oral answers</td><td>4th week</td></tr><tr><td>Mid-term MCQ (multiple-choice quiz)</td><td>30</td><td>Test</td><td>5th week</td></tr><tr><td>Lectures online academy</td><td>10</td><td>Quiz</td><td>Weekly</td></tr><tr><td>1st attestation total</td><td>100</td><td></td><td></td></tr><tr><td>2nd attestation</td><td>Oral presentation</td><td>30</td><td>Oral defence</td><td>7th week</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Oral presentation	30	Oral defence	3 rd week	Online game	30	Oral answers	4th week	Mid-term MCQ (multiple-choice quiz)	30	Test	5 th week	Lectures online academy	10	Quiz	Weekly	1 st attestation total	100			2nd attestation	Oral presentation	30	Oral defence	7th week
Period	Assessment type	Number of points	Exam Form	Schedule (Week #)																																
1 st attestation	Oral presentation	30	Oral defence	3 rd week																																
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	1 st attestation total	100																																		
2nd attestation	Oral presentation	30	Oral defence	7th week																																

		SWOT analysis	30	Oral defense	9th week
		End-term MCQ (multiple-choice quiz)	30	Test	10 th week
		Lectures online academy	10	Quiz	Weekly
		2nd attestation total	100		
	Final Exam		100	MCQ	During final exam session
Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100$.					
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Recommended prerequisites	History of Kazakhstan.				
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> theories and approaches to the study of culture; the basic principles of culture; description and analysis of the current problems in culture; critical thinking and applying it in practice <p>Students will have the skill to</p> <ul style="list-style-type: none"> to explain and interpret knowledge (concepts, ideas, theories) in cultural studies; to explain the socio and ethical values of society as a product of integration processes; to explain the nature of situations in various spheres of social communication based on the content of theories and ideas of cultural studies discipline; to present information reasonably about the various stages of cultural development in Kazakhstan; to express correctly and defend reasonably own opinion on socially significant issues. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> communicate constructively in different environments, collaborate in teams and negotiate, show tolerance, express and understand different viewpoints; select and use reference materials; locate, organize, and interpret information, and take notes. 				
Content	This course is oriented to reveal the features of national culture development in the context of the global culture and civilization. Topics include: structure of culture,				

	language of culture, semiotics of culture, anatomy of culture, and historical development of culture in Kazakhstan from ancient times until modern days.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle, Online academy (https://learn.astanait.edu.kz/).
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Gabitov T. «Actual Problems of Kazakh Culture. Kazakh Culture Challenges». - Saarbrücken: Lambert publishing, 2016. 2. Handbook of Cultural Studies and Education. /P.T. Peter. - 1 ed. - Great Britain: Routledge and Taylor & Francis Group, 2019. - 531 p. - ISBN 9780815385097: 52800.00. 3. Introducing Cultural Studies /L. Brian. - 3 ed. - Oxon: Routledge, 2017. - 459 p. - ISBN 9781138915725: 27500.00. 4. Cultural Studies: Theory and Practice/ B. Chris, A. J. Emma. - 5 ed. - Great Britain: SAGE Publications, 2016. - 722 p. - ISBN 9781473919457: 28900.00. <p>Supplementary Literature:</p> <ol style="list-style-type: none"> 1. Murashchenkova, N.V. (2022), Ethnic, Civic, and Global Identities as Predictors of Emigration Activity of Student Youth in Belarus, Kazakhstan, and Russia (article). Cultural-Historical Psychology, 2022 Vol.18, No. 3. doi:10.17759/chp.2022180314 2. Globalisation and culture (article)(http://socialalternatives.com/) - Culture, Tradition and Globalisation: Some Philosophical Questions - Vol. 35 No. 1, 2016 3. Seksenbayeva, G. (2019) Archives and Records (article) Formation and development of the Central State Archive of cinema, photographic materials and sound records of the Kazakh SSR (1943–1991). The Journal of the Archives and Records Association. Vol.40 No.3 (https://doi.org/10.1080/23257962.2019.1592746) 4. Hall G., Birchall C. New cultural studies: adventures in theory - Edinburgh University Press. 2006 // https://web.p.ebscohost.com/ehost/detail/detail?vid=0&sid=05424f3f-d996-4bd1-b47f-b61e26c93c2a%40redis&bdata=Jmxhbm9cnUmc2l0ZT1laG9zdC1saXZl#AN=179721&db=nlebk 5. D. Jones, M. Marion. The dynamics of counterpoint in Asian Studies - Albany: SUNY Press. 2014//https://web.p.ebscohost.com/ehost/detail/detail?vid=0&sid=4e0c27a1-9014-4623-8465-bd3895859b57%40redis&bdata=Jmxhbm9cnUmc2l0ZT1laG9zdC1saXZl#AN=706808&db=nlebk 6. L. Steiner, C. Christians Key concepts in critical cultural studies - Urbana [Ill.] : University of Illinois Press. 2010//https://web.p.ebscohost.com/ehost/detail/detail?vid=0&sid=2159bc8c-a4e8-4956-a40a-02c527a53f23%40redis&bdata=Jmxhbm9cnUmc2l0ZT1laG9zdC1saXZl#db=nlebk&AN=569700

	<p>7. Journal of Muslim Minority Affairs. Apr2002, Vol. 22 Issue 1, p11. 28p. (doi: 10.1080/13602000220124818) - Soviet Nationality, Identity, and Ethnicity in Central Asia: Historic Narratives and Kazakh Ethnic Identity</p> <p>8. Archives and Records (article) Formation and development of the Central State; Archive of cinema, photographic materials and sound records of the Kazakh SSR (1943–1991) - Formation and development of the Central State Archive of cinema, photographic materials and sound records of the Kazakh SSR (1943–1991) (https://doi.org/10.1080/23257962.2019.1592746)</p> <p>9. Культурология [Текст]: учебник. / Л.П. Воронкова - 2-е изд. - Москва: Юрайт, 2021. - 202с. - ISBN 978-5-534-07934-0: 8800.00.</p> <p>10. Культурология [Текст]: учебное пособие для СПО / под ред. И.Ф. Кефели. - 2-е изд. - Москва : Юрайт, 2021. - 165с. - ISBN 978-5-534-89560-5: 7500.00.</p>
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Module name:	Discrete Mathematics																		
Code	DM 1205																		
Trimester	2 for the educational program Computer Science																		
Person responsible for the module	Assoc. Prof. Nurlan Ismailov, PhD																		
Lecturer(s)	Nurlan Ismailov Shynar Abutalipova Tolkynay Yelemes Moldir Toleubek																		
Language	English																		
Relation to curriculum	Bachelor programmes: Big Data Analysis, Software Engineering, IT Management. Compulsory course.																		
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																		
Workload of course components and credits per trimester	<table border="1"> <tr> <th rowspan="2">ECTS credits</th><th colspan="2">Contact hours</th><th rowspan="2">ISIS</th><th rowspan="2">SIS</th><th rowspan="2">Total hours</th></tr> <tr> <th>Lectures</th><th>Practice sessions</th></tr> <tr> <td>5</td><td>30</td><td>20</td><td>10</td><td>90</td><td>150</td></tr> </table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	5	30	20	10	90	150
ECTS credits	Contact hours		ISIS	SIS	Total hours														
	Lectures	Practice sessions																	
5	30	20	10	90	150														
Course assessment and																			

forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1 st attestation	Problem Sets	20	Submission of written reports	2 nd week and 4 th weeks
		Quiz	20	Written	3 rd week
		Mid-term Exam	60	Written	5 th week
		1st attestation total	100		
	2 nd attestation	Problem Sets	20	Submission of written reports	7 th week and 9 th
		Quiz	20	Written	8 th week
		End-term Exam	60	Written	10 th week
		2nd attestation total	100		
	Final Exam		100	Written	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100$.				
Requirements according to the examination regulations	In case if the student did not attend more than 30% of the classes without any reasonable excuses, the teacher has a right to mark him as “not graded”, and the student wouldn’t be admitted to the exam. In other words, students must participate in at least 70% of all online/offline class time, otherwise he/she fails the course.				
Recommended prerequisites	No prerequisites (it is enough to know school mathematics program well)				
Module objectives/intended learning outcomes	<p>Course goal(s): Course goal is to familiarize students with an initial base in mathematics such as sets, basic of combinatorics and graph theory. The main goal is to be able to apply above-mentioned tools to problems in postrequisites courses.</p> <p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> - To demonstrate knowledge of mathematical knowledge; - To understand basic mathematical principles (proving, counting, understanding discrete objects); - Basic school mathematical knowledge; - Ability to construct examples and counterexamples <p>Students will have the skill to:</p> <ul style="list-style-type: none"> - To solve counting problems using different enumeration methods; - To apply basic techniques involving discrete objects such as sets, functions, graphs and mathematical expressions in discrete mathematics; - To develop mathematical abilities in writing programs by computers. <p>By the end of this course the students will be able to:</p> <ul style="list-style-type: none"> - Learn main proof techniques of mathematics; - Be familiar with important discrete objects; - Understand counting principles of combinatorics; - Be able to transform discrete problems into simple forms; 				

	- Describe programming questions in terms of graphs and trees.
Content	The course includes logics, set theory, functions, and fundamental principles of counting, number theory, inclusion-exclusion principle, recurrence relations, graph theory.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Goodnotes; Microsoft Teams; LMS Moodle.
Reading list	<p>1. Lecture presentations.</p> <p>Main textbooks:</p> <p>2. E. Goodaire and M. Parmenter Discrete Mathematics with Graph Theory (third edition);</p> <p>3. Kenneth H. Rosen. Discrete Mathematics and Its Applications (seventh edition);</p> <p>Additional textbooks:</p> <p>4. Ralph P. Grimaldi. Discrete and Combinatorial Mathematics (fifth edition);</p> <p>5. А.С. Джумадиляев, Элементы дискретной математики, Алматы, 2004;</p> <p>6. Д. Андерсон Дискретная математика и комбинаторика. 2004;</p> <p>Open Online Resources</p> <p>1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematics-for-computer-science-fall-2010/</p> <p>2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematics-for-computer-science-spring-2015/index.htm</p>

Module name:	Web Technologies 1 (Front End)																		
Code																			
Trimester	2																		
Person responsible for the module	Zhantileuov Eldiyar M.Sc.																		
Lecturer(s)	G. Yegemberdiyeva, M.Sc. A. Seitenov, M.Sc D. Yespenbetova, M.Sc D. Baizhaksynov, M.Sc																		
Language	English																		
Relation to curriculum	Bachelor programs: Software Engineering, Computer Science Compulsory course.																		
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																		
Workload of course components and credits per trimester	<table border="1"> <tr> <th rowspan="2">ECTS credits</th><th colspan="2">Contact hours</th><th rowspan="2">ISIS</th><th rowspan="2">SIS</th><th rowspan="2">Total hours</th></tr> <tr> <th>Lectures</th><th>Practice sessions</th></tr> <tr> <td>5</td><td>20</td><td>30</td><td>10</td><td>90</td><td>150</td></tr> </table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	5	20	30	10	90	150
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Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1 st attestation	Assignment 1	40	Project	2 nd week
		Assignment 2	40	Project	4 rd week
		Mid-term Exam	20	MCQ	5 th week
		1st attestation total	100		
	2nd attestation	Assignment 3	40	Project	7 th week
		Assignment 4	40	Project	9 th week
		End-term Exam	40	MCQ	10 th week
		2nd attestation total	100		
	Final Exam		100	Final Project Defense	During final exam session
Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.					
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Recommended prerequisites	Basic programming skills				
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <ul style="list-style-type: none">• <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none">• Understanding the foundational concepts and principles of front-end web development.• Demonstrating proficiency in designing and implementing static web pages using HTML and CSS.• Applying knowledge of web standards and best practices for creating user-friendly and accessible websites. <p>Students will have the skill to:</p> <ul style="list-style-type: none">• Create structured and semantically meaningful web pages using HTML5, including proper use of tags, elements, and attributes.• Style web pages using CSS3, including selectors, properties, and values to achieve desired visual layouts and effects.• Implement responsive web design techniques to ensure optimal display across different devices and screen sizes.• Incorporate multimedia elements, such as images, videos, and audio, into web pages using appropriate HTML and CSS techniques.• Understand and utilize web typography principles, including font selection,				

	<p>sizing, and styling.</p> <ul style="list-style-type: none"> • Apply user interface design principles to create intuitive and user-friendly web forms and interactive components. • Understand the basics of client-side scripting languages (e.g., JavaScript) and their integration with HTML and CSS. • Utilize web development tools, such as text editors, web browsers, and developer consoles, to create and debug web pages. • Perform website testing and debugging to ensure proper functionality and compatibility across different browsers and platforms. <p>In terms of competences, students will be able to:</p> <ul style="list-style-type: none"> • Analyze and evaluate the structure and design of existing websites, identifying strengths and areas for improvement. • Design and develop static web pages that meet specified requirements and adhere to web standards and best practices. • Apply problem-solving skills to troubleshoot and resolve issues related to web page layout, styling, and functionality. • Collaborate effectively in team-based web development projects, demonstrating good communication and coordination skills. • Stay updated with emerging trends and technologies in front-end web development and adapt their skills accordingly. • Demonstrate creativity and innovation in designing visually appealing and user-friendly web interfaces. • Apply principles of web accessibility to ensure inclusive design and equal access to web content for diverse users. • Present and communicate web development concepts and solutions effectively to both technical and non-technical audiences.
Content	Course goal is to introduce students to web development based on technologies such as HTML, CSS, JavaScript. Furthermore, it will cover Bootstrap and JQuery. this course materials will assist students in developing skills necessary to work as a Frontend Web Developer.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 6. Ben Frain. Responsive Web Design with HTML5 and CSS: Develop future-proof responsive websites using the latest FITMT-S and CSS techniques, 3rd Edition. 7. Flanagan David. JavaScript: The Definitive Guide. 8. Jon Duckett. .JavaScript and .jQuery: interactive front-End Web Development.

Module name:	Object-oriented programming (Java)
Code	
Trimester	2
Person responsible for the module	Senior-lecturer A. Khaimuldin, MSc
Lecturer(s)	<ol style="list-style-type: none"> 1. Chingis Kharmyssov, PhD 2. Ryspayeva Marya 3. Nurgazina Dana 4. Smakova Saida 5. Khaimuldin Nursultan, MSc

	6. Baizhaksynov Daniyar Aimukhambetov Olzhas																																																					
Language	English																																																					
Relation to curriculum	Bachelor programmes: Software Engineering, Computer Science.																																																					
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																																					
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Recommended prerequisites	Introduction to Programming 1.
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • The concepts of object-oriented design, data abstraction, encapsulation, polymorphism, data hiding, and inheritance. • Java specifics: language features, JVM, GC, JDBC, etc. • Divide and Conquer strategy in the context of objects. • Object-Oriented design principles by Robert C. Martin (SOLID). • Identifying the boundaries of an object according to the level of abstraction. • Working with data from different sources: console, file, database, etc. • Coding in general using interfaces and behavior segregation. • Dividing responsibilities among classes and components. • Creational design patterns (Singleton, Builder, Factory). <p>Students will have the skill to</p> <ul style="list-style-type: none"> • Construct well-designed classes for effective problem solving without violating the boundaries of responsibility. • Improve the structure of software programs by organizing classes into modules. • Frame the objects in the problem domain to those in the program. • Construct efficiently aligned interfaces with concrete area of behavior coverage. • Cope with troubleshooting and error handling. • Set a connection to various databases using JDBC. • Write a sequential and readable code. <p>In terms of competences, students will be able to</p> <ul style="list-style-type: none"> • Increase productivity by using libraries and reusable code. • Obtain flexibility through the principles of polymorphism. • Build scalable and maintainable software. • Design a class that serves as a program module or package. • Apply gathered knowledge in the development process.
Content	This course covers object-oriented programming principles and techniques using Java programming language. Topics include classes, abstraction, data hiding, encapsulation, inheritance, polymorphism, programming paradigms and SOLID principles. Additionally, the course provides the basic concepts for software design and reuse.
Media employed	Multimedia classrooms equipped with computer, projection, and audio system; Whiteboard; Microsoft Teams; LMS Moodle, JetBrains IDEA, Postgres.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Paul Deitel. Java How to Program : Early Objects / D. Paul, D. Harvey. - 11 ed. - Harlow : Pearson, 2018. - 1286 p. - ISBN 978-1-29222385-8 : 49900,00.004.43 - D 33. 2. Robert C. Martin Series. Clean Architecture : A craftsman's Guide to Software Structure and Design / Robert C. Martin Series. - Boston : Addison-Wesley, 2018. - 404 p. - ISBN 978-0-13-449416-6 : 23720.00. 004 - M29. <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. Brahma Dathan. Object-Oriented Analysis, Design and Implementation: An Integrated Approach / D. Brahma, R. Sarnath. - 2 ed. - India : Springer, 2015. - 471 p. - ISBN 9783319242781 : 31500.00

	2. Bruce Eckel.Thinking in Java / E. Bruce. - 4 ed. - USA : MindView, 2006. - 1482 p. - ISBN 978-0-13-187248-6 : 27300.00.004 E38.
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Term 3

Module name:	Calculus 1																																											
Code																																												
Trimester	3																																											
Person responsible for the module	Prof. B.Mukanova, Dr.Phys-Math. Sci.																																											
Lecturer(s)	B.Mukanova																																											
Language	English																																											
Relation to curriculum	Bachelor programmes Compulsory course.																																											
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																											
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	Final Exam	100	Written	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100$.			
Requirements according to the examination regulations	<p>Course and university policies include:</p> <p>Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).</p> <p>Late submissions are not accepted.</p> <p>No cheating, duplication, falsification of data, plagiarism, and crib</p> <p>Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>			
Recommended prerequisites	Secondary scholar Mathematics course.			
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • Limits of sequences and their properties. • Continuity and properties of continuous functions. • Derivatives and their applications in extremum problems. • Antiderivatives and methods to evaluate them. • Definite integrals in 1D and 2D cases. • Gradient and its properties. • Improper integrals. <p>Students will know how to</p> <ul style="list-style-type: none"> • Use both the limit definition and rules of differentiation to differentiate functions. • Sketch the graph of a function using asymptotes, critical points, the derivative test for increasing/decreasing functions, and concavity. • Apply differentiation to solve applied max/min problems. • Evaluate integrals both by using the Fundamental Theorem of Calculus. • Evaluate integrals using advanced techniques of integration, such as substitutions and integration by parts. • Use L'Hospital's rule to evaluate certain indefinite forms. • Apply integration to compute arc lengths, volumes of revolution and surface areas. • Determine convergence/divergence of improper integrals and evaluate convergent improper integrals. • Compute the gradient of the multidimensional function. • Evaluate elementary double integrals and apply them to compute areas and volumes. <p>In terms of Competences, students will be able</p> <ul style="list-style-type: none"> • to understand concepts related to limits, continuity, derivatives and basic integrals; • to understand concepts of multidimensional functions, partial derivatives, gradient, double and multidimensional integrals; • to work with these concepts numerically, graphically and analytically; • to apply above-mentioned tools to problems in postrequisites courses; 			
Content	The course covers differentiation and integration of functions of one variable and basic concepts of multidimensional Calculus, with applications.			
Media employed	University is equipped with Multimedia Studio to prepare the online content of the lectures. Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.			

Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Thomas' Calculus. By George b. Thomas, revised by J.Hass, C.Heil, M.D.Weir, Pearson Publishing Company. 14n edition 2. George b. Thomas, Jr., Ross L. Finney, Calculus and Analytic Geometry. Part II. Addison-Wesley Publishing Company. 9 th edition. <p>Supplementary literature:</p> <ol style="list-style-type: none"> 3. G. N. Berman, A collection of problems on a course of Mathematical Analysis 4. Г.М.Фихтенгольц. Основы математического анализа, Т.1, Изд-е 9-ое, Изд. Лань – 2008. – 448 с. 5. Ибрашев Х.И., Еркеғұлов Ш.Т. Математикалық анализ курсы. - Алматы, 1970. 6. Темірғалиев Н.Т. Математикалық анализ. 1 бөлім. - Алматы: Мектеп, 1987.
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Module name:	Web Technologies 2 (Backend)									
Code										
Trimester	3									
Person responsible for the module	Zhantileuov Eldiyar M.Sc.									
Lecturer(s)	Bakhytzhan Beisembiyev, MSc Gulnara Abitova, PhD Yelaman Apushev, MS, Yerlan Orakbayev, MS									
Language	English									
Relation to curriculum	Bachelor programmes: Big Data Analysis, Software Engineering, IT Management. Compulsory course.									
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>									
Workload of course components and	<table><tr><td></td><td>Contact hours</td><td>ISIS</td><td>SIS</td><td>Total hours</td></tr></table>						Contact hours	ISIS	SIS	Total hours
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credits per trimester	ECTS credits	Lectures	Practice sessions					
	5	30	20	10	90	150		
Course assessment and forms of examination								
	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)			
	1 st attestation	Assignment 1	20	Mini Project	2 nd week			
		Assignment 2	20	Mini Project	3 rd week			
		Assignment 3	20	Mini Project	4 th week			
		Mid-term Exam	40	Coding Challenge	5 th week			
		1 st attestation total	100					
	2 nd attestation	Assignment 1	20	Mini Project	7 th week			
		Assignment 2	20	Mini Project	8 th week			
		Assignment 3	20	Mini Project	9 th week			
		End-term Exam	40	Written	10 th week			
		2 nd attestation total	100	Coding Challenge				
	Final Project		100	Demonstration	During final exam session			
	Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.							
	Requirements according to the examination regulations	Course and university policies include:						
		Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).						
		Late submissions are not accepted.						
		No cheating, duplication, falsification of data, plagiarism, and crib						
		Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.						

Recommended prerequisites	Basic programming, Web Technologies 1 (Front-End), Databases
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • Understanding of back-end development; • Good knowledge in web development including understanding of MVC, chosen framework, SQL/NoSQL, HTML, CSS and JavaScript or other programming languages and backend tools and technologies; <p>Students will have the skill to</p> <ul style="list-style-type: none"> • To create, debug, and maintain dynamic websites and use gathered knowledge of creating dynamic web sites with chosen framework and database; • To use different APIs, to write own RESTful API; • To deploy web application; • To manage and present information to support making a business- critical decision; • To interact, collaborate and communicate effectively with your instructor and fellow students; <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • Installing development environment of creating website on chosen framework; • Interact web application with SQL/NoSQL as well as with front- end; • Create a database application; • Learn how to secure code; • Deliver short, easy presentations and documents that are well considered, compelling and supported by evidence; • Research and evaluate information; • Present findings in an organized and compelling manner; • Discuss the notion that every problem has multiple solutions, each with its own advantages and disadvantages, and that success is tied to finding the technical solution that best fits into the non-technical dimensions of a specific problem.
Content	<p>"WEB Technologies 2 (Back End)" is a 10-week course and it provides the knowledge to design and develop dynamic, database-driven web applications. This course covers in depth the most important techniques widely used by web developers. Students learn how to connect to database</p> <p>and perform practices with the database to create database-driven forms both with SQL and NoSQL databases. Also, course includes knowledge to gain skills including work with APIs, building RESTful APIs, deployment and modern security concepts' usage.</p>

Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	Basic Literature: <ol style="list-style-type: none"> 1. Web Development with Node and Express: Leveraging the .JavaScript Stack by Ethan Brown - Published by O'Reilly Media, Inc.,2019. 2. Beginning Nodejs, Express & MongoDB Development by Greg, Lim.2019 3. JavaScript & jQuery. The Missing Manual by David Sawyer McFarland. - Published by O'Reilly Media, Inc., 2015.

Module name:	Coding Lab																		
Code																			
Trimester	3																		
Person responsible for the module	Nurgazy Meruert																		
Lecturer(s)	Nurgazy Meruert																		
Language	English																		
Relation to curriculum	6B06101 “Computer Science”, 6B06102 “Software Engineering”																		
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																		
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ECTS credits	Contact hours		ISIS	SIS	Total hours														
	Lectures	Practice sessions																	
5	30	20	10	90	150														

Course assessment and forms of examination			
	Period	Milestones compliance	Number of points
	1 st Attestation	1. Project Proposal	20
		2. Project Plan (schedule graph must be included)	20
		3. Milestone 1	
		4. Milestone 2	20
		5. Milestone 3	20
	2 nd Attestation	1. Milestone 4	20
		2. Milestone 5	20
3. Milestone 6		20	
4. Milestone 7		20	
5. Milestone 8 (Must include at least 60% of working project)		20	
Final exam	- Presentation	25	
	- Documentation report	25	
	- Project	50	
Total	0,6 * Attestation + 0,4*Final		
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.		
Recommended prerequisites	“Introduction to Programming”, “Web technologies”, “Object Oriented Programming”, “Introduction to Databases”		
Module objectives/inten			

ded learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> ● Students should understand and discriminate the strengths and weaknesses of scheduling policies, interposes communication methods and memory management issues in timesharing systems. ● Students should evaluate the relevant issues that will enable them to make informed judgments about computer information protection and security. <p>Students will have the skill to</p> <ul style="list-style-type: none"> ● create sequences of instructions; ● Recognise patterns in code; ● Use software to create basic programs; ● Debug simple programs by using logical reasoning to predict the actions instructed by the code; ● Understand that programs execute by following precise and unambiguous instruction; ● develop a more efficient and effective software writing style, having identified the key problems and issues of processing in a multiprocessing environment; ● recognize, describe, find, and retrieve the professional information from their project works; ● Use repetition in logo to create algorithms; ● Create simple programs in scratch 2 with a clear goal. ● Debug basic code; ● Predict the behavior of programs. <p>In terms of competences, students will be able to</p> <ul style="list-style-type: none"> ● Critically evaluate the data and information; ● Learn to express their creativity using coding and technology ● making exciting, personal ideas come to life through coding (this serves as the prime motivator for students to learn, play and push their coding skills further every day); ● learn to visualize a process that accomplishes a task in their project; ● reflect on their thinking and learning to transfer to new challenges; ● excite about learning and exploring coding and technologies on their 'own time'.
Content	<p>This course will introduce project design and implementation and where the main idea is to give to students the practical knowledge of programming and the opportunity to make real projects.</p> <p>During this course, each group of students is allocated active hours with teachers to discuss about their projects and their achievements. The objective of this course is to introduce students to the fundamentals of computer programming, programming language and problem solving. It is designed as the first course for computer science majors. The emphasis is on the fundamentals concepts of computer science, including structured and object-oriented programming, syntax, semantics, testing/debugging, implementation, documentation, and recursion using the any programming language.</p>

	Students will be exposed to development on using text editing and programming skills.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Walpole, Myers, Myers, Ye. Probability and Statistics for Engineers and Scientists. 9th edition. 2016, Pearson. 2. Sheldon Ross. Introduction to Probability and Statistics for Engineers and Scientists. 5th edition. 2014, Elsevier. 3. Sheldon Ross. First Course in Probability. 10th edition. 2019, Pearson Education. <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. L. Wasserman. All of Statistics. Springer, 2005 2. Lange, Applied Probability. Springer, 2015 3. Jobson: Applied Multivariate Data Analysis, Volume I: Regression and Experimental Design.

Module name:	Innovation Lab
Code	
Trimester	3
Person responsible for the module	Olzhas Aimukhambetov
Lecturer(s)	Olzhas Aimukhambetov
Language	English
Relation to curriculum	6B06101 “Computer Science”, 6B06102 “Software Engineering”
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p>

	Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.					
Workload of course components and credits per trimester						
	ECTS credits	Contact hours		ISIS	SIS	Total hours
		Lectures	Practice sessions			
	5	30	20	10	90	150
Course assessment and forms of examination	Period		Milestones compliance		Number of points	
	1 st Attestation	1. Project Proposal		20		
		2. Project Plan (schedule graph must be included)		20		
		3. Milestone 1				
		4. Milestone 2		20		
		5. Milestone 3		20		
	2 nd Attestation	1. Milestone 4		20		
		2. Milestone 5		20		
3. Milestone 6		20				
4. Milestone 7		20				
5. Milestone 8 (Must include at least 60% of working project)		20				
Final exam	- Presentation		25			
	- Documentation report		25			
	- Project		50			
Total	0,6 * Attestation + 0,4*Final					
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted.					

	<p>No cheating, duplication, falsification of data, plagiarism, and crib</p> <p>Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>
Recommended prerequisites	<p>“Introduction to Programming”, “Web technologies”,</p> <p>“Object Oriented Programming”, “Introduction to Databases”</p>
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> ● selected industry, operations, finances, and a market analysis; ● understand the strengths and weaknesses of scheduling policies; ● communication methods and memory management issues in timesharing systems. <p>Students will have the skill to</p> <ul style="list-style-type: none"> ● Create presentation of idea or product; ● identify a problem and solution, in which area it can be important; ● Create templates on Figma; ● Use software to create basic programs; ● Debug simple programs by using logical reasoning to predict the actions instructed by the code; ● Test the product to find out some disadvantages or add features; ● discriminate the strengths and weaknesses of scheduling policies, interposes communication methods and memory management issues in timesharing systems; ● express their ideas clearly and effectively, both verbally and in written form; ● Build a customer base, who will use the product. <p>In terms of competences, students will be able to</p> <ul style="list-style-type: none"> ● Critically evaluate the data and information; ● Learn to express their creativity using presentation skills; ● making exciting, personal ideas come to life through coding (this serves as the prime motivator for students to learn, play and push their coding skills further every day); ● work in team and delegate tasks; ● learn to visualize a process that accomplishes a task in their project; ● test own product with assess of some group of users.
Content	<p>This course will introduce project design and implementation and where the main idea is to know how to start new projects and the opportunity to make them real. During this course, each group of students is allocated active hours with teachers to discuss about their projects and their achievements. The objective of this course is to introduce students to the fundamentals of computer programming, programming language and problem solving. It is designed as the first course for computer science</p>

	majors. The emphasis is on the fundamentals concepts of computer science, including structured and object-oriented programming, syntax, semantics, testing/debugging, implementation, documentation, and recursion using the any programming language. Students will be exposed to development on using text editing and programming skills.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Walpole, Myers, Myers, Ye. Probability and Statistics for Engineers and Scientists. 9th edition. 2016, Pearson. 2. Sheldon Ross. Introduction to Probability and Statistics for Engineers and Scientists. 5th edition. 2014, Elsevier. 3. Sheldon Ross. First Course in Probability. 10th edition. 2019, Pearson Education. <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. L. Wasserman. All of Statistics. Springer, 2005 2. Lange, Applied Probability. Springer, 2015 3. Jobson: Applied Muhivariate Data Analysis, Volume I: Regression and Experimental Design.

Module name:	Algorithms and Data Structures						
Code							
Trimester	3						
Person responsible for the module	Senior-lecturer Aigerim Aibatbek, M.Sc.						
Lecturer(s)	A.Aibatbek, M.Sc., A. Kyzyrkanov M.Sc., N. Karimzhan MSIT , G. Mussina M.Sc.						
Language	English						
Relation to curriculum	Bachelor programs: Computer Science, Smart Technologies. Compulsory course.						
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are online sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Lab Sessions are offline sessions where a topic is reinforced with additional exercises and quizzes.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assignments.</p>						
Workload of course components and							
	ECTS credits	Contact hours			ISI S	SIS	Total hours
		Lectures	Practice sessions	Lab sessions			

credits per trimester	<table><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td>20</td><td>10</td><td>20</td><td>10</td><td>90</td><td>150</td></tr></table>													5	20	10	20	10	90	150																																			
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Course assessment and forms of examination	<table><tr><th>Period</th><th>Assessment type</th><th>Number of points</th><th>Exam Form</th><th>Schedule (Week #)</th></tr><tr><td rowspan="4">1st attestation</td><td>Assignments: Assignment 1, Assignment 2</td><td>40</td><td>Submission of code answers</td><td>Weekly</td></tr><tr><td>Quiz 1</td><td>20</td><td>Multiple Choice questions and practical task</td><td>3rd week</td></tr><tr><td>Mid-term Exam</td><td>40</td><td>Multiple Choice Questions and practical task</td><td>5th week</td></tr><tr><td>1st attestation total</td><td>100</td><td></td><td></td></tr><tr><td rowspan="4">2nd attestation</td><td>Assignments: Assignment 3, Assignment 4</td><td>40 20 20</td><td>Submission of code answers</td><td>Weekly</td></tr><tr><td>Quiz 2</td><td>20</td><td>Multiple Choice Questions and practical task</td><td>8th week</td></tr><tr><td>End-term Exam</td><td>40</td><td>Multiple Choice Questions and practical task</td><td>10th week</td></tr><tr><td>2nd attestation total</td><td>100</td><td></td><td></td></tr><tr><td colspan="2">Final Exam</td><td>100</td><td>Multiple Choice Questions</td><td>During final exam session</td></tr><tr><td colspan="5">Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final = 100.</td></tr></table>						Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Assignments: Assignment 1, Assignment 2	40	Submission of code answers	Weekly	Quiz 1	20	Multiple Choice questions and practical task	3 rd week	Mid-term Exam	40	Multiple Choice Questions and practical task	5 th week	1st attestation total	100			2nd attestation	Assignments: Assignment 3, Assignment 4	40 20 20	Submission of code answers	Weekly	Quiz 2	20	Multiple Choice Questions and practical task	8 th week	End-term Exam	40	Multiple Choice Questions and practical task	10 th week	2nd attestation total	100			Final Exam		100	Multiple Choice Questions	During final exam session	Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.				
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Requirements according to the examination regulations	<p>Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>																																																						
Recommended prerequisites	“Introduction to programming C++”, “Object-oriented programming (Java)”																																																						
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <ul style="list-style-type: none">• <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none">• Understanding fundamental concepts and principles of algorithms and data structures.																																																						

	<ul style="list-style-type: none"> • Demonstrating proficiency in implementing and analyzing efficient algorithms. • Applying knowledge of data structures to solve computational problems. <p>Students will have the skill to:</p> <ul style="list-style-type: none"> • Design and analyze algorithms for a variety of computational problems, including sorting, searching, graph traversal, and optimization. • Implement and manipulate common data structures such as arrays, linked lists, stacks, queues, trees, heaps, and hash tables. • Understand and utilize algorithmic paradigms, including divide and conquer, dynamic programming, greedy algorithms, and backtracking. • Analyze the time and space complexity of algorithms, including Big O notation and asymptotic analysis. • Use algorithmic design techniques to solve real-world problems, considering factors such as efficiency, correctness, and scalability. • Apply appropriate data structures and algorithms for specific tasks, considering trade-offs between time and space efficiency. • Implement algorithms and data structures in a programming language of choice, demonstrating proficiency in coding and debugging. • Understand and apply algorithmic problem-solving strategies, such as problem decomposition, pattern recognition, and algorithm design patterns. • Interpret and evaluate existing algorithms and data structures, identifying their strengths, weaknesses, and potential improvements. <p>In terms of competences, students will be able to:</p> <ul style="list-style-type: none"> • Apply critical thinking and problem-solving skills to analyze and solve complex computational problems using appropriate algorithms and data structures. • Collaborate effectively in team-based projects that involve designing, implementing, and optimizing algorithms and data structures. • Communicate algorithmic concepts and solutions clearly and concisely, both orally and in written form, to technical and non-technical audiences. • Apply ethical and professional practices in algorithm design and implementation, including considerations of privacy, security, and fairness. • Stay updated with emerging algorithms and data structures, as well as advancements in algorithmic techniques and optimization strategies. • Demonstrate adaptability and flexibility in applying algorithms and data structures to different problem domains and computational environments. • Continuously reflect on and improve their algorithmic problem-solving skills through self-assessment and feedback.
Content	<p>“Algorithms and Data Structures” is a 10-week course, where the main focus is designed on solving computational problems that involve collections of data. Students will study a core set of data abstractions, data structures, and algorithms that provide a foundation for creating and maintaining efficient programs and algorithms in particular, and software in general.</p> <p>Topics include: recursion; asymptotic analysis and Big-O notation; physical data structures: array, linked list; logical data structures: hash tables, tree; sorting algorithms: bubble sort, merge sort, quick sort; searching algorithms: linear and binary search; graph; searching algorithms: BFS and DFS; dynamic programming.</p>
Media employed	Classrooms equipped with computer, projection, whiteboard; Microsoft teams, LMS Moodle, Learn Astana IT platform.
Reading list	Basic Literature:

	<p>1. Lecture notes (available on moodle.astanait.edu.kz);</p> <p>2. Brian Christian. Algorithms To Live By: The Computer Science of Human Decision / C. Brian, G. Tom. - Great Britain: William Collins, 2017. - 351 p. - ISBN 9780007547999 : 12900.00.392 - C 56 ;</p> <p>3. Thomas H. Cormen, Introduction to Algorithms, The MIT Press, 4th Edition, 2022.</p> <p>Supplementary literature:</p> <p>1. Aditya Y. Bhargava - Grokking Algorithms: An Illustrated Guide for Programmers and Other Curious People, Manning; 1st edition (May 1, 2016);</p> <p>2. Loiane Groner, Learning JavaScript Data Structures and Algorithms, 2014.</p>
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Term 4

Module name:	Sociology																		
Code	Soc 1105																		
Trimester	(depending on the RUPs of programmes, can be taught in different trimesters)																		
Person responsible for the module	Senior lecturer Kusmanova Assem, M.Sc.																		
Lecturer(s)	E.Otar, PhD. A.Kusmanova, M.Sc. A.Nurkanat, M.Sc. A.Zhanadilova, M.Sc. K.Issayeva, M.Sc.																		
Language	English																		
Relation to curriculum	Bachelor programmes: All Compulsory course.																		
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																		
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>2</td><td>10</td><td>10</td><td>10</td><td>30</td><td>60</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	2	10	10	10	30	60
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2	10	10	10	30	60														
Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td>1st attestation</td><td>Assignments</td><td>20</td><td>Preparing of presentations, defense of presentations</td><td>Weekly</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Assignments	20	Preparing of presentations, defense of presentations	Weekly				
Period	Assessment type	Number of points	Exam Form	Schedule (Week #)															
1 st attestation	Assignments	20	Preparing of presentations, defense of presentations	Weekly															

		Mid-term Exam	10	Research project (theoretical part)	5 th week
		1st attestation total	100		
	2nd attestation	Assignments	20	Preparing of presentations, defense of presentations	Weekly
		End-term Exam	10	Research project (practical part)	10 th week
		2nd attestation total	100		
	Final Exam		100	Quiz	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100$.				
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Requirements according to the examination regulations	Fill in the info according your requirements <i>examination regulations are commonly provided in the University's Academic Policy.</i>				
Recommended prerequisites	Culture Studies				
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> theories and approaches to the study of society and its subsystems; formation of ideas about the basic principles of functioning of modern society and its social institutions; understand main sociological theories and concepts; know basic themes in Sociology; understand relationship between society, science, and technology. <p>• understanding the relationship between society, science, and technology;</p> <p>Students will have the skills to</p> <ul style="list-style-type: none"> read and understand a range of sociological texts and articles; listening to lectures, presentations and interviews; participating in group discussions; access and take part in informal discussions; prepare and give poster presentations; develop team-working skills to prepare presentations; recognize and use sociological terms, categories, and concepts; improve self-study and ICT skills; develop research skills and critical thinking; 				

	<ul style="list-style-type: none"> • develop self and peer evaluation skills; • present reasoned and substantiated information about different stages of development of Kazakh society, social and interpersonal relations; • analyse the features of the social institution in the context of their role in the modernization of Kazakh society; • analyse of different situations in different spheres of communication from the position of correlation with the system of values, social, business, cultural, legal and ethical norms of Kazakhstani society. <p>In terms of competences, students will be able to:</p> <ul style="list-style-type: none"> • read academic texts; • critically read and discussion of academic articles.
.Content	This course is aimed to form a socio-humanitarian worldview of students in the context of solving problems of modernization of public consciousness. Additionally, the course introduces students to the present sociological studies on issues in science and technologies.
Media employed	Multimedia classrooms equipped with computer, projector and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Tonja R. Conerly, Kathleen Holmes, Asha Lal Tamang, Jennifer Hensley, Jennifer L. Trost, Pamela Alcasey, Kate McGonigal, Heather Griffiths, Nathan Keirns, Eric Strayer, Tommy Sadler, Susan Cody-Rydzewski, Gail Scaramuzzo, Sally Vyain, Jeff Bry, Faye Jones (2021) Introduction to Sociology 3e. 2. Bruce C. Straits (2018) Approaches to social reserach <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. Giddens, A., & Sutton, P. W. (2017). Sociology (8th ed.). Polity Press. 2. Brinkerhoff, D. B., Ortega, S. T., & Weitz, Professor of Sociology Rose. (2013). Essentials of sociology (9th ed.). Wadsworth Publishing. 3. Ritzer G. Introduction to Sociology. SAGE, 2015. 4. Giddens A. Introduction to Sociology. W.W. Norton & Company, 2014. 5. Kendall D. Sociology in Our Times: The Essentials. Wadsworth Publishing, 2014. 6. Macionis, J.J., Plummer, K. Sociology: A Global Introduction. Pearson, 2014. 7. Schaefer R.T. Sociology in Modules / R.T. Schaefer. McGrawHill, 2016. 8. Meena, Sonam (2019) Durkheim and Sociological Method 9. Social Forces (2018) Bauman and Contemporary Sociology: A Critical Analysis 10. Simoni, Valerio Voirol, Jérémie (2021) Remittances and morality: family obligations, development, and the ethical demands of migration 11. Farrugia, David Threadgold, Steven Coffey, Julia (2018) Young subjectivities and affective labour in the service economy

Module name:	Political Science
Code	
Trimester	5 trimester
Person responsible for the module	Maral Zhanarstanova, PhD in Political Science, assistant professor Yenglik Dossymkhan, PhD in Political Science, senior lecturer Aidana Kaldybekova, MA, lecturer
Lecturer(s)	Maral Zhanarstanova, PhD Yenglik Dossymkhan, PhD

	Aidana Kaldybekova MA																																																													
Language	English																																																													
Relation to curriculum	Bachelor programmes: all majors Compulsory course.																																																													
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the political problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																																													
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Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.																																																														
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.																																																													
Recommended prerequisites	<i>History of Kazakhstan, Cultural studies, Sociology</i>																																																													

Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> - get acquainted with basic elements of political theory and political concepts; - explore the various topics covered in Political Science, its history, its impact on society and individuals, and its limitations in real world applications; - gain a working understanding of the field of Political Science and all it encompasses; - acquire the capacity to interpret and assess political ideas and political behaviours in an independent manner; - develop argumentative skills on conflicting topics; - formation of critical thinking and functional literacy skills. <p>Students will have the skills:</p> <ul style="list-style-type: none"> - ability to understand political theories and concepts in order to understand different viewpoints; - ability of think critically and enhance problem-solving skills; - ability of carrying out individual works on researching, drafting, writing and editing; - ability to select and use reference materials; - ability of discussing and interpreting different political thoughts and trends. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> - understand political behaviour in connection with social change and challenge; - understand the role and function of the politics in everyday life; - have a basic comprehension on characteristics of political trends; - understand the development and significance of political thoughts and theories; - interpret and apply concepts, ideas and notions on political processes and developments;
Content	<p>This course is an introduction to the basic theories and concepts in the Political Science, including: connection between everyday life with the political system; historical development of the area; political systems, ideologies & philosophies; international relations; and Kazakhstan's profile in the framework of the studied discourses. Related topics include interdisciplinary areas, such as sociology, economy, culturology, public policy and security studies.</p> <p>This course will offer an overview of current research in the field of political science, with an emphasis on theoretical studies in this field and on studies that focus on political situation in the Republic of Kazakhstan.</p>
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <p>W. Philips Shively. Power and Choice: An Introduction to Political Science. Rowman & Littlefield Publishers. 2018.</p> <p>Michael Marder. Political Categories. Thinking beyond Concepts. New York. Columbia University Press. 2019.</p> <p>William N. Dunn. Public Policy Analysis An Integrated Approach Sixth Edition. Routledge and Taylor & Francis Group, 2018.</p> <p>David Williams. Progress, Pluralism, and Politics: Liberalism and Colonialism, Past and Present. Montreal: McGill-Queen's University Press. 2020.</p> <p>Supplementary literature:</p> <p>Simon, D. W., Romance, J., & Riemer, N. (2018). The challenge of politics: an introduction to political science. CQ press.</p> <p>Pinker, S. (2018). Enlightenment now: The case for reason, science, humanism, and progress. Chicago (Author-Date, 15th ed.).</p> <p>Gates, M. (2019). The Moment of Lift: How Empowering Women Changes the World (Unabridged).</p> <p>Hawking, S., Redmayne, E., Thorne, K. S., & Hawking, L. (2020). Brief answers to the big questions. John Murray.</p>

	Gates, B. (2021). How to avoid a climate disaster: the solutions we have and the breakthroughs we need. Penguin UK.
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Module name:	Calculus 2																																																
Code																																																	
Trimester	4 for the educational program Software Engineering																																																
Person responsible for the module	Assoc. Prof. Madi Raikhan, PhD																																																
Lecturer(s)	Madi Raikhan, PhD, Kassabek Samat, PhD, Chiganbayeva Diana, PhD Satbayev Syndar, Msc																																																
Language	English																																																
Relation to curriculum	Bachelor programmes: Big Data Analysis, Software Engineering, IT. Compulsory course.																																																
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																																
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>5</td><td>30</td><td>20</td><td>10</td><td>90</td><td>150</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	5	30	20	10	90	150																														
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	2nd attestation total	100																																															
Final Exam		100	Written	During final exam session																																													

	<div>Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100.$</div>
Requirements according to the examination regulations	<p>Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>
Recommended prerequisites	Linear Algebra, Calculus I.
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • understanding of limits and continuity of functions of several variables. • understanding of linear approximation for multi-variable functions. • introduction to optimization of multi-variable functions using the second derivative test and Lagrange Multipliers. • understanding of infinite number series, functional series, (i.e., Power series, Taylor series, Fourier series) and applications. • mathematical knowledge. • understanding basic mathematical principles (proving, solving). • understanding surface sketching, partial derivatives, directional derivatives, geometry of curves, geometry of surfaces, maxima and minima, infinite series, ODE, multiple integrals, line, and surface integral. • line integrals, path-independence, potential functions, and surface integrals. <p>Students will have the skills:</p> <ul style="list-style-type: none"> • to use multiple integrals to calculate areas, volumes, masses and centers of mass for standard plane regions and solids; • to compute partial derivatives and directional derivatives; • to develop mathematical abilities in writing programs by computers; <p>In terms of competences, students will be able to</p> <ul style="list-style-type: none"> • write mathematical statements and problem solutions using mathematical symbols. • understand key mathematical concepts and the application of the main mathematical tools.
Content	The distinct feature of this part of the course is its focus on multi-dimensional analysis, as opposed to the one-dimensional analysis that you learned in Calculus I. This course covers the function of several variables, partial derivative, surface sketching, partial derivatives, directional derivatives, geometry of curves, geometry of surfaces, maxima and minima, infinite series, ODE, multiple integrals, line and surface integral. The ideas of calculus I-II apply to numerous areas of human knowledge such as engineering, physics, mathematics, biology, and many others.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. W George b. Thomas, Jr., Ross L. Finney, Calculus and Analytic Geometry. Part II. Addison-Wesley Publishing Company. 14 th edition. 2. Lecture presentations.

	Supplementary literature: <ol style="list-style-type: none"> 1. Sherman K. Stein, Anthony Barcellos. Calculus and analytic geometry, 5th ed. - McGraw-Hill, Inc.1992. 2. S. L. Ross, Differential Equations – John Wiley & Sons, 1984, 3rd ed. 3. G. N. Berman, A collection of problems on a course of Mathematical Analysis
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Module name:	The Kazakh Language 1 (B2)																																															
Code	K(R)Ya 1104 K(R) Ya 2105																																															
Trimester	4																																															
Person responsible for the module	Assoc. Prof. G.Kamiyeva, PhD Assoc. Prof. B. Dinayeva, PhD Assoc. Prof. S. Sapina, PhD																																															
Lecturer(s)	G.Kamiyeva, B.Dinayeva, S.Sapina																																															
Language	Kazakh language																																															
Relation to curriculum	Bachelor programmes: Computer Science, Software Engineering, Big Data Analysis, Industrial Automation, Media Technologies, Cyber Security, Telecommunication Systems, IT Management, Digital Journalism. Compulsory course.																																															
Type of teaching	Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																															
Workload of course components and credits per trimester	<table border="1"> <tr> <th rowspan="2">ECTS credits</th><th>Contact hours</th><th rowspan="2">ISIS</th><th rowspan="2">SIS</th><th rowspan="2">Total hours</th></tr> <tr> <th>Practice sessions</th></tr> <tr> <td>5</td><td>50</td><td>50</td><td>50</td><td>150</td></tr> </table>				ECTS credits	Contact hours	ISIS	SIS	Total hours	Practice sessions	5	50	50	50	150																																	
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Course assessment and forms of examination	<table border="1"> <tr> <th>Period</th><th>Assessment type</th><th>Number of points</th><th>Exam Form</th><th>Schedule (Week #)</th></tr> <tr> <td rowspan="4">1st attestation</td><td>Problem Sets</td><td>30</td><td>Submission of written reports</td><td>Weekly</td></tr> <tr> <td>Quiz</td><td>30</td><td>Written</td><td>3rd week</td></tr> <tr> <td>Mid-term Exam</td><td>40</td><td>Written</td><td>4th week</td></tr> <tr> <td>1st attestation total</td><td>100</td><td></td><td></td></tr> <tr> <td rowspan="4">2nd attestation</td><td>Problem Sets</td><td>30</td><td>Submission of written reports</td><td>Weekly</td></tr> <tr> <td>Quiz</td><td>30</td><td>Written</td><td>7th week</td></tr> <tr> <td>End-term Exam</td><td>40</td><td>Written</td><td>9th week</td></tr> <tr> <td>2nd attestation total</td><td>100</td><td></td><td></td></tr> <tr> <td colspan="2">Final Exam</td><td>100</td><td>Written</td><td>During final exam session</td></tr> </table>				Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Problem Sets	30	Submission of written reports	Weekly	Quiz	30	Written	3 rd week	Mid-term Exam	40	Written	4 th week	1st attestation total	100			2 nd attestation	Problem Sets	30	Submission of written reports	Weekly	Quiz	30	Written	7 th week	End-term Exam	40	Written	9 th week	2nd attestation total	100			Final Exam		100	Written	During final exam session
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	<p>Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100$.</p>
Requirements according to the examination regulations	<p>Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>
Recommended prerequisites	B1 level of the Kazakh language
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> the syntaxes of the general Kazakh language in speaking, reading, listening and writing; functional language for general communication; rules of word building. <p>Students will have the skill to</p> <ul style="list-style-type: none"> determine the specific vocabulary related to the topic and use it in everyday life; use words, phrases and grammatical structures appropriately; read the text fluently; interpret information given in texts; use the syntax rules in the Kazakh language. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> understand the content of various types of texts; ask and answer questions in various situations; write dictation according to KAZTEST requirements; compose texts in a written form.
Content	<p>The subject "Kazakh language" is intended for students at the B2 level. Practical Kazakh language is intended for teaching the Kazakh language to students of Russian departments. The curriculum of the Kazakh language is based on the latest linguistic and methodological achievements of the teaching of the Kazakh language. The educational-methodological complex is based on a modular training system. The proposed program takes into account the educational levels of students, the purpose, value and positions of the lesson, types of speaking activities; It consists of content that meets the requirements of listening, speaking, writing.</p>
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> Zhakanova J.R., Igenova A.A. Kazakh language. Advanced Level: Tutorial. Nur-Sultan, 2019. - 195 p. Abduova B.S., Asanova U.O. Kazakh language: a study tool for Russian-speaking groups. - Astana, 2017. -282 p. Balabekov A.K., Bozbaeva-Hung A.T., Dosmambetova G.K., Salykhova B.O., Khazimova A.Zh.. Kazakh language: textbook for intermediate and advanced level. National testing center. - Astana: 2017

	<p>4. Kuzekova, Z.S. Functional practical grammar of the Kazakh language: textbook. - Astana: Foliant, 2015.- 180 p.</p> <p>5. Dinaeva B.B., Kamieva G.K. Kazakh language. Educational tool for IT students. - Astana, 2023. - 200 p.</p> <p>Supplementary literature:</p> <p>1. Bainbridge J. Media and journalism: a new approach to theory and practice: textbook [Text]: textbook/ Zh. Bainbridge, N. Gok, L. Tainan .- Almaty : Davir, 2019.- 592 p. (100 new textbooks).</p> <p>2. Ter-Minasova S.G. Language and intercultural communication: textbook [Text]: textbook/ S.G. Ter-Minasova.- Almaty: National Translation Bureau, 2018.- 320 p. (100 new textbooks).</p> <p>3. Dinaeva B.B., Sapina S.M. Theoretical and practical foundations of academic literacy. Educational tool. Revised 2nd Edition. - Nur-Sultan, 2020. -200 p.</p>
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Module name:	Kazakh language (for foreigners). Elementary (A1)																																			
Code	K(R)Ya 1104 K(R) Ya 2105																																			
Trimester	4																																			
Person responsible for the module	Assoc. Prof. B. Dinayeva, PhD																																			
Lecturer(s)	B. Dinayeva,																																			
Language	Kazakh language																																			
Relation to curriculum	Bachelor programmes: Software Engineering, IT Management. Compulsory course.																																			
Type of teaching Тип преподавания	Practice sessions bring students' reading, listening, writing and speaking skills to a level where they can understand. Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																			
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td>Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Practice sessions</td></tr><tr><td>5</td><td>50</td><td>50</td><td>50</td><td>150</td></tr></table>					ECTS credits	Contact hours	ISIS	SIS	Total hours	Practice sessions	5	50	50	50	150																				
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Course assessment and forms of examination Оценка курса и формы экзамена	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td rowspan="4">1st attestation</td><td>Problem Sets</td><td>30</td><td>Submission of written reports</td><td>Weekly</td></tr><tr><td>Quiz</td><td>30</td><td>Written</td><td>1rd week</td></tr><tr><td>Mid-term Exam</td><td>40</td><td>Written</td><td>4th week</td></tr><tr><td>1st attestation total</td><td>100</td><td></td><td></td></tr><tr><td rowspan="2">2nd attestation</td><td>Problem Sets</td><td>30</td><td>Submission of written reports</td><td>Weekly</td></tr><tr><td>Quiz</td><td>30</td><td>Written</td><td>7th week</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Problem Sets	30	Submission of written reports	Weekly	Quiz	30	Written	1 rd week	Mid-term Exam	40	Written	4 th week	1 st attestation total	100			2nd attestation	Problem Sets	30	Submission of written reports	Weekly	Quiz	30	Written	7 th week
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2nd attestation	Problem Sets	30	Submission of written reports	Weekly																																
	Quiz	30	Written	7 th week																																

	End-term Exam	40	Written	9 th week
	2nd attestation total	100		
	Final Exam	100	Written	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100$.			
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.			
Recommended prerequisites	Level 0			
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • spelling rules, paying attention to punctuation and reading intonation and pausing. • Understanding and using basic Kazakh vocabulary and grammar structures. • Demonstrating proficiency in simple oral and written communication in Kazakh. • Applying knowledge of Kazakh culture and customs in basic social interactions. <p>Students will have the skill to</p> <ul style="list-style-type: none"> • master the sound features and pronunciation of words; • read the text fluently. • speak in a short dialogues. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • determine the specific vocabulary related to the topic and use it in everyday life; • use words, phrases and grammatical structures appropriately; • read according to the orthographic norm of the Kazakh language; • write information about him/herself, family, address, etc.; • write simple dictation according to KAZTEST requirements. 			
Content	<p>The subject "Kazakh language" is intended for students at the A1 level. A1 level is studied by foreign students as an initial level, at the end of the course students should learn 1200-1300 words. At the A1 level, students should be able to read texts in the Kazakh language, tell information about themselves, understand and express everyday words.</p> <p>The "Kazakh language" A1 level course teaches the student to use the Kazakh language at a basic level through reading, writing, listening, and pronunciation skills.</p>			
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.			
Reading list	Basic Literature:			

Список для чтения	<p>1. L. Beysenbaeva, A. Balabekov, A. Zhakypzhanova "Kazakh language" textbook for relatives abroad (A1 - basic level). - Nur-Sultan, 2021.</p> <p>2. N. Dauletkereeva, N. Nurmagambetova, A. Smykova "Kazakh language" textbook for relatives abroad (A1 - basic level). - Nur-Sultan, 2021.</p> <p>3. G.K. Dosmambetova, A.K. Balabekov, A.T. Bozbaeva-Hung, A.D. Seisenova. Kazakh language. Simple level A1. Textbook. - Astana: National Testing Center, 2016. -268 p.</p> <p>Supplementary literature:</p> <p>1. Tileshev E., Turlybekova J., Kayupova N. Let's learn Kazakh. - Astana: "Rukhaniyat", 2010.</p> <p>2. Bekturova A.Sh., Bekturov Sh.K. Kazakh language for all. - Almaty: Atamura, 2004. -720 p.</p>
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Module name:	Russian Language 1				
Code	K(R)Ya 1104				
Trimester	4				
Person responsible for the module	Assoc. Prof. L.Orazgalieva, candidate of philological sciences				
Lecturer(s)	<p>Zhusupov A.E. –a.zhussupov@astanait.edu.kz, Assoc. Prof., candidate of philological sciences</p> <p>Orazgalieva L.M. – Laura.Orazgaliyeva@astanait.edu.kz, Assoc. Prof., candidate of philological sciences, Assoc. Prof., candidate of philological sciences</p> <p>Moldachmetova Z.N. –z.moldakhmetova@astanait.edu.kz, Assoc. Prof., candidate of philological sciences</p> <p>Shaheen A.A. –a.shaheen@astanait.edu.kz, Assoc. Prof., candidate of philological sciences</p> <p>Malikova Zh.D. zhanar.malikava@astanait.edu.kz, Assoc. Prof., candidate of philological sciences</p>				
Language	Russian				
Relation to curriculum	Compulsory course.				
Type of teaching	<p>Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>				
Workload of course components and credits per trimester	ECTS credits	Contact hours Practice sessions	SIS	IS	Total hours
	5	50	10	90	150
Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
1 st attestation	Problem Sets		30	Submission of written reports	Weekly
	Quiz		30	Written	2 nd week
	Mid-term		40	Written	4 th week
	Exam				

		1st attestation total	100		
	2nd attestation	Problem Sets	30	Submission of written reports	Weekly
		Quiz	30	Written	8 th week
		End-term Exam	40	Written	10 th week
		2nd attestation total	100		
	Final Exam		100	Written	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final}$ = 100.				
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Recommended prerequisites	Cultural studies				
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in: <ul style="list-style-type: none"> Understanding and using Russian vocabulary and grammar structures. Demonstrating proficiency in oral and written communication in Russian. Applying knowledge of Russian culture and customs in various contexts. Students will have the skill to <ul style="list-style-type: none"> request and communicate information in accordance with the situation of communication, evaluate the actions and deeds of participants, use information as a tool to influence the interlocutor in situations of knowledge and communication in accordance with certification requirements; discuss ethical, cultural, socially significant issues in discussions, express their point of view, defend it with arguments, critically evaluate the opinion of interlocutors. In terms of Competences, students will be able to <ul style="list-style-type: none"> compose everyday, socio-cultural, official and business texts in accordance with generally accepted norms, functional orientation, using lexical-grammatical and pragmatic material of a certain certification level adequate to the goal. 				
Content	The course of the Russian language as a discipline of the general education cycle is designed for students of groups with the Kazakh language of instruction at universities, is studied in accordance with the requirements of the State Standard. The course is aimed at developing the language personality of the student, who is able to carry out cognitive and communicative activities in Russian in the areas of interpersonal, social, professional, intercultural communication in the				

	context of the implementation of state trilingual programs and the spiritual modernization of national consciousness.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <p>1. Русский язык для IT специалистов. Составители: Молдахметова З.Н, Маликова Ж.Д., Оразгалиева Л.М., Жусупов А.Е. – Астана, 2022. - 133 с.</p> <p>2. Ахметжанова А.И. Русский язык: культура речи. – Алматы, «Қазақ университеті», 2018. - 120 с.</p> <p>3. Русский язык для академических целей: учебное пособие для студентов факультетов естественных наук (коллектив составителей). – Алматы, 2018. – 134 с.</p> <p>Supplementary literature:</p> <p>http://www.gramota.ru/</p> <p>http://insight.glos.ac.uk/researchmainpage/ResearchCentres/WAM/PGWAM/Documents/portsmouth_harvard_guide.pdf</p> <p>https://scholar.google.com/scholar?q=+Galimzhan+seilov&btnG=&hl=ru&as_sd t=0%2</p> <p>http://festival.1september.ru</p> <p>http://www.antonchehov.ru/</p> <p>http://www.ajtmator.ru/</p> <p>http://www.lihachev.ru/</p> <p>https://uwaterloo.ca/centre-for-teaching-excellence/teaching-resources/teaching-tips/developing-assignments/cross-discipline-skills/promoting-assessing-critical-thinking</p>

Module name:	Database Management Systems									
Code										
Trimester	4									
Person responsible for the module	Senior Lecturer N. Assanova, M.Sc									
Lecturer(s)	Dariya Bissengaliyeva, M.Sc.									
Language	English									
Relation to curriculum	Bachelor programmes: Big Data Analysis, Software Engineering, Computer Science, IT Management, Digital Journalism.									
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>									
Workload of course components and	<table><tr><td></td><td>Contact hours</td><td>ISIS</td><td>SIS</td><td>Total hours</td></tr></table>						Contact hours	ISIS	SIS	Total hours
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credits per trimester	ECTS credits	Lectures	Practice sessions			
	5	20	30	10	90	150
Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	
	1 st attestation	Laboratory works	45	Submission of tasks solved	2 nd and 4 th weeks	
		Quiz	25	MCQ Test	3 rd week	
		Mid-term Exam	30	Mixed tasks exam (theory and practice)	5 th week	
		1 st attestation total	100			
	2 nd attestation	Problem Sets	30	Submission of tasks solved	7 th and 9 th weeks	
		Quiz	30	MCQ Test	8 th week	
		End-term Exam	40	Mixed tasks exam (theory and practice)	10 th week	
		2 nd attestation total	100			
	Final Exam		100	Mixed tasks exam (theory and practice)	During final exam session	
	Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.					
	Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Recommended prerequisites		ICT or basic computer knowledge				
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. The student will show a working knowledge to: <ul style="list-style-type: none">choose and apply appropriate methodologies and techniques to solve corresponding tasks on the way of implementing the kind of service's pipelines.analyze the runtime performance of various approaches and commands in terms of the size of their requests, averages, best, and worst cases.understand the fundamentals of relational databases.provide a consistent layer of data and control redundancies.use PostgreSQL built-in functions for complex tasks.create transactions to solve business challenges.					

	<ul style="list-style-type: none"> perform calculations across a set of rows using window and aggregate functions. enhance query performance by using indexes. look at a query plan to find possible solutions to the problems occurred. <p>Students will have the skill to:</p> <ul style="list-style-type: none"> Design a database. Design transactional blocks to group related queries. Use the PostgreSQL supplied built-in functions to solve sophisticated problems. Describe the features and syntax of PostgreSQL. Use PostgreSQL programming constructs and conditionally control code flow. Handle runtime errors. <p>In terms of Competences, students will be able to:</p> <ul style="list-style-type: none"> design methodology for databases and verify their structural correctness. implement databases and applications software primarily in the relational model. use querying languages, primarily PostgreSQL, and other database supporting software; apply the theory behind various database models and query languages. implement security and integrity policies relating to databases.
Content	“Database Management Systems” is a course, which focuses on concepts and structures necessary to design and implement a database management system. Various modern data models, data security and integrity, and concurrency will be discussed.
Media employed	Multimedia classrooms equipped with computer, projection, and audio system; Whiteboard; Microsoft Teams; LMS Moodle; Software Applications for managing Databases (PostgreSQL server, pgAdmin, Command Line Tools, DataGrip, online diagramming applications).
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> Postgres: The first experience, P.Luzanov, E.Rogov, I.Levshin, 2020. Fundamentals of Database Systems, 7th Edition, R.Elmasri, S.Navathe, 2016 Jan L.Harrington. Relational Database Design and Implementation / L.H.Jan. – 4 ed. – Amsterdam : Elsevier Inc., 2016. – 689p. – ISBN 978-0-12-804399-8 : 35900.00.004.65 – J 23.

Module name:	Analytic methods in Computer Science
Code	
Trimester	4
Person responsible for the module	Assoc. Prof. Nurlan Ismailov, PhD
Lecturer(s)	Nurlan Ismailov

Language	English																																																					
Relation to curriculum	Bachelor programmes: Big Data Analysis, Software Engineering, IT Management. Elective course.																																																					
Type of teaching	Lectures serve to introduce new concrete examples and solution of them, Furthermore, it develops and provides solving methods based on these examples theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																																					
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Recommended prerequisites	“Discrete Mathematics” or “Algorithms and Data structures”, or “Algorithms”.
Module objectives/intended learning outcomes	<p>Course goal(s): The course presents mathematical materials necessary for the Computer Science student to approach the study of many advanced topics in theoretical Computer Science at the graduate level.</p> <p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • Understanding and applying mathematical concepts and techniques relevant to computer science. • Demonstrating proficiency in using analytical methods to solve computational problems. • Applying mathematical reasoning to analyze and evaluate algorithms and data structures. <p>Students will have the skill to:</p> <ul style="list-style-type: none"> • Understand and use mathematical notation, symbols, and terminology commonly encountered in computer science. • Apply mathematical concepts such as logic, sets, functions, relations, and graphs to model and solve computer science problems. • Apply principles of discrete mathematics, including combinatorics, probability, and graph theory, to analyze algorithms and data structures. • Use mathematical techniques, such as induction, proof methods, and mathematical induction, to reason about correctness and complexity of algorithms. • Apply principles of numerical methods and analysis to solve computational problems, including approximation, interpolation, and numerical integration. • Apply principles of linear algebra and matrix operations to solve problems related to computer graphics, machine learning, and data analysis. • Understand and apply principles of probability and statistics relevant to computer science, including probability distributions, hypothesis testing, and regression analysis. • Utilize mathematical modeling and optimization techniques to formulate and solve real-world computational problems. • Use mathematical software tools, such as MATLAB, Python libraries, or mathematical modeling languages, to solve mathematical problems and analyze data. <p>In terms of competences, students will be able to:</p> <ul style="list-style-type: none"> • Apply mathematical reasoning and critical thinking skills to analyze and solve complex computational problems. • Communicate mathematical concepts and solutions clearly and effectively to both technical and non-technical audiences. • Apply mathematical problem-solving strategies, such as problem decomposition, abstraction, and pattern recognition, to solve computational problems. • Analyze and evaluate existing algorithms and data structures using mathematical techniques and optimization methods.

	<ul style="list-style-type: none"> • Collaborate effectively in team-based projects that involve mathematical modeling, analysis, and optimization. • Stay updated with emerging mathematical methods and tools relevant to computer science and adapt their skills accordingly. • Reflect on their mathematical problem-solving process and identify areas for improvement and further practice.
Content	The course includes recursions, sums, integer functions, elementary number theory, binomial coefficients, special numbers, generating functions, discrete probability, asymptotics.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Goodnotes; Microsoft Teams; LMS Moodle.
Reading list	<p>1. Lecture slides/presentations/notes.</p> <p>Main textbooks:</p> <p>2. R. Graham, D. Knuth, O. Patashnik, Concrete Mathematics: A Foundation for Computer Science (2nd Edition).</p> <p>Additional textbooks:</p> <p>3. D. E. Knuth, The Art of Computer Programming, Volume 1, 3rd. Edition, Addison-Wesley, 1998.</p> <p>4. N.J.A. Sloan's On-Line Encyclopedia of Integer Sequences.</p> <p>Open Online Resources</p> <p>1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematics-for-computer-science-fall-2010/</p> <p>2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematics-for-computer-science-spring-2015/index.htm</p>

Module name:	Design and Analysis of Algorithms
Code	
Trimester	4
Person responsible for the module	Senior Lecturer R. Omirgaliyev, MSc
Lecturer(s)	R. Omirgaliyev, MSc O. Aitmukhambetov, MSc. G. Shuteyeva, MSc
Language	English
Relation to curriculum	Bachelor programmes: Software Engineering, Computer Science, Big Data Analysis. Elective course.
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>

Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lecture s</td><td>Practice sessions</td></tr><tr><td>5</td><td>30</td><td>20</td><td>10</td><td>90</td><td>150</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lecture s	Practice sessions	5	30	20	10	90	150																																											
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Recommended prerequisites	Algorithms and Data Structures.																																																													
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none">• learn good principles of algorithm design;• learn how to analyse algorithms and estimate their worst-case and average-case behaviour (in easy cases);																																																													

	<ul style="list-style-type: none"> become familiar with fundamental data structures and with the manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles; <p>Students will have the skill to</p> <ul style="list-style-type: none"> Analyze the asymptotic performance of algorithms. Write rigorous correctness proofs for algorithms. Demonstrate a familiarity with major algorithms and data structures. Apply important algorithmic design paradigms and methods of analysis. Synthesize efficient algorithms in common engineering design situations. <p>In terms of Competences, this course designed for people who are already familiar with programming and requires basic understandings of algorithms.</p>
Content	This core course covers good principles of algorithm design, elementary analysis of algorithms, and fundamental data structures. The emphasis is on choosing appropriate data structures and designing correct and efficient algorithms to operate on these data structures.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Alsuwaiyel M.H. (2016). Algorithms: Design Techniques and Analysis, New Jersey: World Scientific <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. Design and Analysis of Computer Algorithms by Aho, Hopcroft and Ullman, Pearson

Term 5

Module name:	Computer Organization and Architecture 1
Code	
Trimester	5
Person responsible for the module	Sandibek Umirov, Master of technical science in Computer system and Software, senior-lecturer, s.umirov@astanait.edu.kz, Astana IT University, Expo, C1.3.352.
Lecturer(s)	Sandibek Umirov
Language	English
Relation to curriculum	Bachelor programmes: 6B06101 “Computer Science”
Type of teaching	Lectures Online Video lecture. Practice sessions (seminars) Lab works with hardware devices and software.

	Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																																					
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Recommended prerequisites	Students should have the following skills and knowledge: • PC and Internet navigation skills																																																					

	<ul style="list-style-type: none"> • Basic Windows and Linux system concepts • Basic Networking concepts • Binary and Hexadecimal understanding • Awareness of basic programming concepts
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • Understanding the basic components and organization of a computer system, including the CPU, memory, input/output devices, and storage. • Demonstrating proficiency in explaining the functions and interactions of the major components of a computer system. • Applying knowledge of computer organization to analyze and evaluate the performance and efficiency of computer systems. <p>Students will have the skill to:</p> <ul style="list-style-type: none"> • Describe the organization and operation of a computer's central processing unit (CPU), including instruction execution, pipelining, and control unit design. • Understand and apply principles of memory hierarchy, including cache memory, virtual memory, and memory management techniques. • Explain the operation and interaction of input/output systems, including device controllers, buses, interrupts, and I/O interfaces. • Understand and analyze the principles of computer arithmetic, including integer and floating-point representations and arithmetic operations. • Understand and apply principles of parallelism and concurrency, including parallel processing architectures and multi-core systems. • Analyze and evaluate the performance and efficiency of computer systems, including metrics such as throughput, latency, and scalability. • Understand and apply principles of instruction set architecture (ISA) design and its impact on computer system performance and compatibility. • Understand and analyze the principles of computer system reliability, including error detection and correction techniques. • Understand and analyze the principles of computer system security, including memory protection, access control, and encryption. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • Explain, install, and navigate an operating system; upgrade components based on customer needs and perform preventive maintenance and advanced troubleshooting. • Describe, remove, and replace select components of a laptop; upgrade components based on customer needs and perform preventive maintenance and advanced troubleshooting. • Describe, remove, and replace select components of a printer/scanner; perform preventive maintenance and troubleshooting. • Describe and install a network; upgrade components based on customer needs and perform preventive maintenance and advanced troubleshooting.

	<ul style="list-style-type: none"> • Apply good communication skills and professional behavior while working with customers. • Perform advanced installation of a desktop computer tower; select components based on customer needs and perform preventive maintenance and advanced troubleshooting. • Upgrade security components based on customer needs and perform preventive maintenance and advanced troubleshooting.
Content	The course designed for people who are new to the study of information technology, and does not require any prior skills.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle. Hardware(Printers, PC, Screws, Tools, Crimping tools, Server, Ip camera, Cables, VirtualBox)
Reading list	<ul style="list-style-type: none"> • Complete A+ Guide to IT Hardware and Software. Cheryl A. Schmidt • Computer Organization and Architecture. Eighth edition, William Stallings. • Structures Computer Organization. Sixth edition. Andrew S. Tanenbaum, Todd Austin. • Official Cert Guide CCNA 200-301. Volume 1. Wendell Odom. • Official Cert Guide CCNA 200-301. Volume 2. Wendell Odom. • Windows 10. Second Edition. Joan Lambert.

Module name:	Kazakh language 2, Advanced (C1)
Code	K(R)Ya 1104 K(R) Ya 2105
Trimester	5
Person responsible for the module	Assoc. Prof. G.Kamiyeva, PhD Assoc. Prof. B. Dinayeva, PhD Assoc. Prof. S. Sapina, PhD
Lecturer(s)	G.Kamiyeva, B.Dinayeva, S.Sapina
Language	Kazakh language
Relation to curriculum	Bachelor programmes: Computer Science, Software Engineering, Big Data Analysis, Industrial Automation, Media Technologies, Cyber Security, Telecommunication Systems, IT Management, Digital Journalism. Compulsory course.
Type of teaching	<p>Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>
Workload of	

course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td>Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Practice sessions</td></tr><tr><td>5</td><td>50</td><td>50</td><td>50</td><td>150</td></tr></table>					ECTS credits	Contact hours	ISIS	SIS	Total hours	Practice sessions	5	50	50	50	150																																						
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Requirements according to the examination regulations	<p>Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>																																																					
Recommended prerequisites	B1 level of the Kazakh language																																																					
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none">main genres of scientific, official-business and journalistic styles;Kazakh culture and customs in various contexts. <p>Students will have the skill to</p> <ul style="list-style-type: none">interpret the text and follow it by determining the purpose of the text, the main game, the problem considered in the text, additional information, evaluating it;give critical opinion, support, suggestions, solutions to problems on the read text/article;																																																					

	<ul style="list-style-type: none"> • use the information in the text while writing essays, making project works and presentations, speaking his opinion during interviews and round tables. • demonstrate proficiency in reading, writing, listening, and speaking in Kazakh. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • participate in various situations in the field of communication in the lexical-grammatical and pragmatic sense; • express personal opinions in planning, solving problems, making decisions due to different social, cultural and academic contexts; • critically evaluate, analyze and summarize information.
Content	<p>The subject "Kazakh language" is intended for students at the C1 level. Practical Kazakh language is intended for teaching the Kazakh language to students of Russian departments. The curriculum of the Kazakh language is based on the latest linguistic and methodological achievements of the teaching of the Kazakh language in the lecture halls of other languages. The educational-methodological complex is based on a modular training system. The proposed program takes into account the educational levels of students, the purpose, value and positions of the lesson, skills and dexterity, types of speaking activities; It consists of content that meets the requirements of listening, speaking, writing (reading, writing, listening, pronunciation, etc.)</p>
Media employed	<p>Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.</p>
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Karabaeva K.A. Kazakh language: educational tool. - Almaty: Kazakh University, 2014. 2. Linear C. Kazakh language guide (spelling, punctuation marks, vocabulary). Astana: Elorda, 2000. - 532 p. 3. "Digital educational resources" related to the subject "Kazakh language-I" and "Kazakh language-II" for students studying in the Russian department. - Astana, 2014. 4. Dinaeva B.B., Kamieva G.K. Kazakh language. Educational tool for IT students. - Astana, 2023. - 200 p. 5. Dinaeva B.B. The language of business correspondence: a study guide for students of all professions. - Nur-Sultan, 2022. -296 p. 6. Kamieva G.K. Keeping documents in the state language. Educational tool. - Nur-Sultan, 2021. -147 p. <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. Akanova D.H., Aldasheva A.M., Akhmetzhanova Z.K., Kadasheva K., Suleymenova E.D. Official business Kazakh language. Textbook complex. First level. Second level. Third level. -Almaty, "Arman-PV", 2002. 2. Bizakov S. Dictionary of synonyms - Almaty: "Arys" publishing house, 2007. - 640 p. 3. Chesenbaev I. Phraseological dictionary - Almaty: "Arys" publishing house, 2007. - 800 p. 4. Kazakh language and national values. A comprehensive study tool. Book 1,2,3,4. - Almaty: Evero, 2018. 5. Explanatory dictionary of the Kazakh language: about 50 thousand words and phrases / general editor. T. Zhanuzakov. - Almaty: Dyke-Press, 2008. - 968 p. 6. Spelling dictionary / Sixth edition. Compiled by: N. Vali, K. Kuderinova, A. Fazylzhanova, Zh. Isaeva, N. Amirzhanova, A. Amirbekova. - Almaty: Davir publishing house, 2013. - 720 p.

Module name:	Kazakh Language (for foreigners). Elementary (A2)																																																					
Code	K(R)Ya 1104 K(R) Ya 2105																																																					
Trimester	5																																																					
Person responsible for the module	Assoc. Prof. B. Dinayeva, PhD																																																					
Lecturer(s)	B. Dinayeva,																																																					
Language	Kazakh language																																																					
Relation to curriculum	Bachelor programmes: Software Engineering, IT Management. Compulsory course.																																																					
Type of teaching Тип преподавания	Practice sessions bring students' reading, listening, writing and speaking skills to a level where they can understand. Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																																					
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td>Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Practice sessions</td></tr><tr><td>5</td><td>50</td><td>10</td><td>90</td><td>150</td></tr></table>					ECTS credits	Contact hours	ISIS	SIS	Total hours	Practice sessions	5	50	10	90	150																																						
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	Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	A1 level of the Kazakh language
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • developing communication skills through speaking, reading, listening and writing tasks; • learning simple words and phrases, • learning to use words and phrases appropriately and to create a dialogue according to the situations encountered in everyday life. <p>Students will have the skill to</p> <ul style="list-style-type: none"> • from the information heard, they determine the specific vocabulary related to the topic and use it in everyday life; • use words, phrases and grammatical structures appropriately; • read the text fluently. • write information about about him/herself, family, address, place of birth, etc. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • study, work, free time, etc. understands the content of simple text in topics; • ask and answer questions in various situations; • write simple dictation according to KAZTEST requirements.
Content	<p>The subject "Kazakh language" is intended for students at the A2 level. Students from abroad study the A2 level as a continuation of the initial level, at the end of the course students should learn 1400-1500 words. A2 level focuses on the formation of the ability to exchange simple information within the presented lexical topics, to understand common words and individual sentences, to describe events and activities in everyday life, to talk about oneself, relatives and acquaintances.</p> <p>The "Kazakh language" A2 level course teaches the student to use the Kazakh language at a basic level through reading, writing, listening, and pronunciation skills.</p>
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list Список для чтения	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. L. Beysenbaeva, A. Balabekov, A. Zhakypzhanova "Kazakh language" textbook for relatives abroad (A1 - basic level). - Nur-Sultan, 2021. 2. N. Dauletkereeva, N. Nurmagambetova, A. Smykova "Kazakh language" textbook for relatives abroad (A2 - basic level). - Nur-Sultan, 2021. 3. G.K. Dosmambetova, A.K. Balabekov, A.T. Bozbaeva-Hung, A.D. Seisenova. Kazakh language. Simple level A1. Textbook. - Astana: National Testing Center, 2016. -268 p. <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. Tileshev E., Turlybekova J., Kayupova N. Let's learn Kazakh. - Astana: "Rukhaniyat", 2010. 2. Bekturova A.Sh., Bekturov Sh.K. Kazakh language for all. - Almaty: Atamura, 2004. -720 p.

Module name:	Russian Language 2
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Code	K(R)Ya 1104																																											
Trimester	5																																											
Person responsible for the module	Assoc. Prof. L.Orazgalieva, candidate of philological sciences																																											
Lecturer(s)	Zhusupov A.E. –a.zhussupov@astanait.edu.kz, Assoc. Prof., candidate of philological sciences Orazgalieva L.M. – Laura.Orazgaliyeva@astanait.edu.kz, Assoc. Prof., candidate of philological sciences, Assoc. Prof., candidate of philological sciences Moldachmetova Z.N. –z.moldakhmetova@astanait.edu.kz, Assoc. Prof., candidate of philological sciences Shaheen A.A. –a.shaheen@astanait.edu.kz, Assoc. Prof., candidate of philological sciences Malikova Zh.D. zhanar.malikava@astanait.edu.kz, Assoc. Prof., candidate of philological sciences																																											
Language	Russian																																											
Relation to curriculum	6B06101 – Computer Science, 6B06102 – Software Engineering, 6B06103 – Big Data Analysis, 6B06104 – Industrial Automation, 6B06105 – Media Technologies, 6B06301 – Cyber Security, 6B06201 – Telecommunication Systems, 6B04101 – IT Management , 6B06202- Smart Technologies, 6B03201 – Digital Journalism, 6B06106 –Mathematical and Computational science. Compulsory course.																																											
Type of teaching	Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																											
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	Final Exam		100	Written	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final}$ = 100.				
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Recommended prerequisites	Cultural studies				
Module objectives/inten- ded learning outcomes	<p><i>By the end of this course students will attain the following learning outcomes.</i></p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • academic literacy and grammatical structures of the language (spelling, punctuation). • qualities of professional speech: richness, purity, logic, expressiveness, accuracy, correctness, clarity, and intelligibility. <p>Students will have the skill to:</p> <ul style="list-style-type: none"> • identify specific vocabulary related to the topic and use it in everyday life and academic settings; • demonstrate proficiency in reading, writing, listening, and speaking; • apply knowledge of culture and customs in various contexts; • express attitude in accordance with the requirements of the professional culture of speech: use terminology, discuss professional topics with a colleague and a layman, define the goal, be correct. • give an assessment of the fact, object, and event. <p>In terms of competencies, students will be able to:</p> <ul style="list-style-type: none"> • compose scientific texts (annotations, reviews, etc.) • use speech aspects of business communication; • perform in front of an audience using the techniques of public speaking. 				
Content	The course of the Russian language as a discipline of the general education cycle is designed for students of groups with the Kazakh language of instruction at universities, is studied in accordance with the requirements of the State Standard. The course is aimed at developing the language personality of the student, who is able to carry out cognitive and communicative activities in Russian in the areas of interpersonal, social, professional, intercultural communication in the context of the implementation of state trilingual programs and the spiritual modernization of national consciousness.				
Media employed	Multimedia classrooms equipped with computer, projector and audio system; Whiteboard; Microsoft Teams; LMS Moodle.				

Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Русский язык для IT специалистов. Составители: Молдахметова З.Н, Маликова Ж.Д., Оразгалиева Л.М., Жусупов А.Е. – Астана, 2022. - 133 с. 2. Ахметжанова А.И. Русский язык: культура речи. – Алматы, «Қазак университеті», 2018. - 120 с. 3. Русский язык для академических целей: учебное пособие для студентов факультетов естественных наук (коллектив составителей). – Алматы, 2018. – 134 с. <p>Supplementary literature:</p> <p>http://www.gramota.ru/ http://insight.glos.ac.uk/researchmainpage/ResearchCentres/WAM/PGWAM/Documents/portsmouth_harvard_guide.pdf https://scholar.google.com/scholar?q=+Galimzhan+seilov&btnG=&hl=ru&as_sdt=0%2 http://festival.1september.ru http://www.antonchehov.ru/ http://www.ajtmatov.ru/ http://www.lihachev.ru/ https://uwaterloo.ca/centre-for-teaching-excellence/teaching-resources/teaching-tips/developing-assignments/cross-discipline-skills/promoting-assessing-critical-thinking</p>
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Module name:	Computational Mathematics																		
Code																			
Trimester	5 for Software Engineering, Big Data Analysis, Computer Science																		
Person responsible for the module	Senior Lecture Rakhimzhanova Anar, PhD																		
Lecturer(s)	Samat Kassenov																		
Language	English																		
Relation to curriculum	Bachelor programmes: Calculus, Linear Algebr, Programming Compulsory course.																		
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																		
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	Lectures	Practice sessions																	
5	30	20	10	90	150														

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1 st attestation	Problem Sets	20	Submission of written reports	2 nd week and 4 th weeks
		Quiz	20	Written	3 rd week
		Mid-term Exam	60	Test	5 th week
		1st attestation total	100		
	2 nd attestation	Problem Sets	20	Submission of written reports	7 th week and 9 th
		Quiz	20	Written	8 th week
		End-term Exam	60	Test	10 th week
		2nd attestation total	100		
	Final Exam		100	Written	During final exam session
Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.					
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Recommended prerequisites	“Calculus 1”, “Calculus 2”, “Linear algebra”				
Module objectives/intended learning outcomes	The student will show a working knowledge in: <ul style="list-style-type: none">• Understanding fundamental mathematical concepts and their applications in computational mathematics.• Demonstrating proficiency in solving mathematical problems using computational tools and algorithms.• Applying mathematical modeling techniques to real-world problems. Students will have the skill to: <ul style="list-style-type: none">• Apply numerical methods to solve mathematical problems.• Utilize matrix operations and linear algebra techniques for solving systems of linear equations and eigenvalue problems.• Employ optimization techniques to find the optimal solutions to mathematical problems.				

	<ul style="list-style-type: none"> • Implement algorithms for solving differential equations numerically, including ordinary differential equations (ODEs) and partial differential equations (PDEs). • Apply statistical methods and probability theory for data analysis and modeling. • Understand and use computational tools and software, such as MATLAB, Python libraries (NumPy, SciPy), or specialized software for numerical computing. • Analyze and interpret numerical results, including assessing accuracy, stability, and convergence of computational methods. • Effectively use mathematical notation, terminology, and symbols in presenting mathematical solutions and explanations. <p>In terms of competences, students will be able to:</p> <ul style="list-style-type: none"> • Formulate mathematical problems as computational problems and choose appropriate numerical methods for solving them. • Critically evaluate the limitations and assumptions of computational methods and understand their impact on the accuracy of solutions. • Design and implement algorithms for solving mathematical problems using programming languages and computational tools. • Analyze and interpret mathematical models and their computational results in the context of real-world applications. • Communicate mathematical concepts and computational solutions effectively through written reports, presentations, or visualizations. • Collaborate with peers in problem-solving activities and project-based assignments in computational mathematics. • Apply computational mathematics techniques in interdisciplinary contexts, such as physics, engineering, or finance.
Content	The course includes logics, set theory, functions, and fundamental principles of counting, number theory, inclusion-exclusion principle, recurrence relations, graph theory.
Media employed	Goodnotes; Microsoft Teams; LMS Moodle.
Reading list	1. Lecture notes (available at moodle.astanait.edu.kz); 2. B.S. Grewal, "Numerical Methods in Engineering & Science", Khanna Publication, Ed. 9th. 3. E. Kreyszing "Advanced Engineering Mathematics" John Wiley & Sons, Inc., Ed 10th.

Module name:	Operating System Concepts
Code	
Trimester	5
Person responsible for the module	Tleubayeva Arailym, MSc in Technical Science (Information Systems), senior-lecturer, CE Dept., a.tleubayeva@astanait.edu.kz ,
Lecturer(s)	Tleubayeva A.A., MSc in Technical Science (Information Systems), senior-lecturer, CE Dept., a.tleubayeva@astanait.edu.kz
Language	English

Relation to curriculum	Bachelor programmes																																													
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																													
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Recommended prerequisites	"ICT", "Algorithmization, data structure and programming", "Software development technology", Computer networks																																													
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in:																																													

	<ul style="list-style-type: none"> • understanding the fundamental concepts and principles of operating systems. • demonstrating proficiency in operating system components, such as process management, memory management, file systems, and input/output systems. • implementing basic operating system functionalities through programming exercises or projects. <p>Students will have the skill to:</p> <ul style="list-style-type: none"> • analyze and explain the structure and functions of different types of operating systems, including batch systems, time-sharing systems, and distributed systems. • apply various process management techniques, including process scheduling, synchronization, and interprocess communication. • understand and utilize memory management techniques, such as virtual memory, paging, and segmentation. • comprehend file system organization, file operations, and file access control mechanisms. • evaluate and troubleshoot issues related to input/output systems, including device management, buffering, and disk scheduling. • apply concepts of deadlock detection, prevention, and avoidance in system resource allocation. • understand the basics of networked and distributed operating systems. <p>In terms of competences, students will be able to:</p> <ul style="list-style-type: none"> • design and develop simple operating system components or modules. • analyze and compare different operating system architectures and designs. • evaluate the performance of operating systems based on various metrics. • identify and troubleshoot common operating system problems and errors. • apply operating system concepts and techniques in solving real-world scenarios or case studies. • collaborate effectively in teams to implement operating system functionalities. • communicate clearly and professionally about operating system concepts and their applications.
Content	<p>The course provides students with knowledge of the basic mechanisms and structure of operating systems, the specifics of their interaction with the hardware of the computer, and the principles of system programming at the level of operating systems of the Linux family.</p> <p>The aim of the course is for students to acquire fundamental theoretical knowledge of the principles of modern operating systems, methods of organising computational processes, methods of developing algorithms for the interaction of applications with the operating system and mechanisms for their implementation.</p>
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ul style="list-style-type: none"> • Operating System Concepts, 9th Edition. 2012 - A. Silberschatz, P. Galvin, G. Gagne. • Computer Organization and Architecture, 10th Edition. 2016 - W. Stollings. • Modern Operating Systems, 4th.ed. 2015 - A. Tanenbaum, H. Bos. • Operating System Concepts and Basic Linux Commands. 2017.- Shital Vivek Ghate.

	<ul style="list-style-type: none"> • Linux for Developers: Jumpstart Your Linux Programming Skills.2017.- William “Bo” Rothwell. <p>Supplementary literature:</p> <ul style="list-style-type: none"> • Windows Internals. Part I, 7th.ed. 2017 - M. Russinovich, D. Solomon, A. Ionescu. • Windows Internals. Part II, 6th.ed. 2012 - M. Russinovich, D. Solomon, A. Ionescu. • Enterprise Open Source and Linux Ubuntu • Oracle® VM VirtualBox® • Best Online Linux Terminals and Online Bash Editors (itsfoss.com)
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Module name:	Advanced Programming																		
Code																			
Trimester	5																		
Person responsible for the module	Senior-lecturer S. Yeleu, MSc																		
Lecturer(s)	Senior-lecturer S. Yeleu, MSc																		
Language	English																		
Relation to curriculum	<p>Bachelor programmes: Big Data Analysis, Software Engineering.</p> <p><i>(Programmes under accreditation are listed)</i></p> <p>Elective course.</p>																		
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																		
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Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1 st attestation	Quiz 1	33,3	Written	3 rd week
		Quiz 2	33,3	Written	5 th week
		Assignment 1	33,3	Written	4 th week
		1 st attestation total	100		
	2nd attestation	Quiz 3	33,3	Written	7 th week
		Quiz 4	33,3	Written	9 th week
		Assignment 2	33,3	Written	8 th week
		2 nd attestation total	100		
	Final Project		100	Submission of written report	During final exam session
Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.					
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Recommended prerequisites	Linear Algebra, Calculus I, Calculus II, Intro to Programming.				
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in: <ul style="list-style-type: none">● Machine learning basics including task types with examples;● Differences between supervised and unsupervised learning;● Regularization techniques for neural networks;				

	<ul style="list-style-type: none"> • Concept of backpropagation; • Different activation functions and initialization methods; • Concept of Convolutional Neural Networks and transfer learning; • Recurrent neural networks; • Natural Language Processing problem and solutions; • Concepts of autoencoders and GANs. <p>Students will have the skills to</p> <ul style="list-style-type: none"> • train simple neural networks using TensorFlow; • plot accuracies and losses for neural networks during training; • visualize weights for images to interpret results of neural network trainings; • use TensorFlow.js to create image classifier using transfer learning and own data <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • Identify the appropriate architecture to use for training neural networks; • Use deep learning to solve real-world problems; • Create a deep learning project from the beginning.
Content	This course covers the fundamentals of applied deep learning and is related to computer science engineering. Topics include: machine learning basics, introduction to deep neural networks, Convolutional neural networks, transfer learning, Recurrent neural networks, Autoencoders, GANs, Natural Language Processing.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Ian Goodfellow, Yoshua Bengio and Aaron Courville. Deep Learning. 2016, MIT press. 2. Aurélien Géron. Hands-on Machine Learning with Scikit-Learn, Keras and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems. 2nd ed., O'Reilly, 2019.

Module name:	Advanced Databases (NoSQL)
Code	6B06101 Software Engineering, 6B06103 Computer Science
Trimester	5
Person responsible for the module	Aivar Sakhipov, MSc in Computer Science
Lecturer(s)	Aivar Sakhipov, MSc in Computer Science,

	Eldiyar Zhantileuov, MSc in Cyber Physical and Social Systems																																													
Language	English																																													
Relation to curriculum	Bachelor programmes: Software Engineering, Computer Science, IT Management. Compulsory course.																																													
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																													
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Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.																																													
Recommended prerequisites	Database Management Systems																																													
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in: <ul style="list-style-type: none">Understanding Databases, Collections and Documents, creating Databases and Collections;Understanding Relations and Data Modelling;																																													

	<ul style="list-style-type: none"> • Working with Shell and Server; • Querying Embedded Fields & Arrays; • Working with Indexes; • Implementation of all features MongoDB offers to work with data efficiently <p>Students will have the skill to</p> <ul style="list-style-type: none"> • install and use MongoDB locally and in the cloud (MongoDB Atlas); • perform CRUD (Create, Read, Update, Delete) operations on MongoDB databases; • filter for data efficiently; • work with both the Mongo Shell and drivers (e.g. Node.js driver); • increase performance by using indexes; • use the Aggregation Framework that's built into MongoDB; • use MongoDB Atlas - the cloud solution offered by MongoDB; • use the serverless platform (Stitch) offered by MongoDB; <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • Define, compare and understand main characteristics of the four types of NoSQL Databases (Document-oriented, Key-Value Pairs, Column-oriented and Graph). • Evaluate NoSQL database development tools and programming languages • Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases.
Content	This course covers the fundamentals of MongoDB, including MongoDB's Document data model, importing data into a cluster, working with CRUD API and Aggregation Framework. In addition to these essential topics, students will learn and work with useful MongoDB tools and services as Atlas, MongoDB's database as a service, MongoDB Compass, a schema visualization tool, as well as many other useful command-line utilities.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1.T.Hills., NoSQL and SQL Data Modeling: Bringing Together Data, Semantics, and Software. Technics Publications, First edition, 2016, 258 p. 2.Carlos Coronel. Database systems / C. Carlos, M. Steven. - 13th. - Boston : Cengage Learning, 2019. - 781p. - ISBN 978-1-337-62790-0 : 24900.00. 3. P. Membrey, D. Hows & E. Plugge., MongoDB Basics. Apress, 1st ed. Edition, 2014, 158 p. 4. R. Copeland , MongoDB Applied Design Patterns: Practical Use Cases with the Leading NoSQL Database. O'Reilly Media, 1st edition, 2013, 244 p. 5. Vaish, Gaurav, Getting Started with NoSQL : Your Guide to the World and Technology of NoSQL, 2013 <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications, 1st Edition ,2019. 2. Redmond, E. & Wilson, J., Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement (1st Ed.). Raleigh, NC: The Pragmatic Programmers, LLC., 2012.

Module name:	Storage systems
Code	

Trimester	5																																																					
Person responsible for the module	Yersultan Tulebayev, MSc in Information Systems																																																					
Lecturer(s)	Yersultan Tulebayev, MSc in Information Systems																																																					
Language	English																																																					
Relation to curriculum	Bachelor programmes: 6B06101 Software Engineering, 6B06103 Computer Science																																																					
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																																																					
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	2nd attestation total	100																																																				
Final Exam		100	MCQ Quiz	During final exam session																																																		
Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.																																																						
Requirements according to the examination regulations	<p>Course and university policies include:</p> <p>Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).</p> <p>Late submissions are not accepted.</p> <p>No cheating, duplication, falsification of data, plagiarism, and crib</p>																																																					

	Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	ICT or basic computer knowledge, Database Management Systems
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • Data Storage, development of Storage Technologies, development trend of Storage Products; • Intelligent Storage Components, RAID Technologies; • Storage Protocols: SCSI, iSCSI, FC, FCoE, SAS and SATA, PCIe and NVMe, RDMA and IB; • Storage Network Architecture: DAS, NAS, SAN; • Storage Resource Tuning Technologies and Applications; • Storage Data Protection Technologies and Applications; • Backup Solution Introduction; • DR Solution Introduction; • Storage System O&M Management. <p>Students will have the skill to</p> <ul style="list-style-type: none"> • Deploy, operate, maintain, and manage storage systems; • Competent for enterprise storage engineers, IT technical support, and other positions; • Understand and master the knowledge and skills about storage technology trends, storage systems architecture, storage basic technologies, storage common advanced technologies, storage service continuity solutions, and basic O&M management of storage systems. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • Understand how storage supports the development and application of Cutting-edge new technologies (Such as AI, Big data, cloud computing); • Understand the key role of storage in the entire IT development; • Master storage ecosystem knowledge and have a more in-depth and systematic understanding of storage common technical knowledge; • Master business continuity technology and application knowledge, and have a deeper understanding of the data center backup solution and disaster recovery solution; • Perform data center storage management and maintenance operations.
Content	This course covers the fundamental data storage concepts and data storage technologies. Topics include: storage technologies, RAID technologies; storage protocols; storage system architecture; storage data protection; backup solution.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Lecture notes (available on https://moodle.astanait.edu.kz) 2. Introduction to Storage Area Networks and System Networking. Jon Tate, Pall Beck, Hector Hugo Ibarra, Shanmuganathan Kumaravel, Libor Miklas, IBM Redbooks, 2018. 3. Storage Systems. Organization, Performance, Coding, Reliability, and Their Data Processing. Alexander Thomasian. 1st Edition - October 13, 2021. <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. Security and Data Storage Aspect in Cloud Computing (Studies in Big Data, 52) 1st ed. 2019 Edition by Prachi S. Deshpande, Subhash C. Sharma, Sateesh K. Peddoju.

	2. Developments in Data Storage: Materials Perspective 1st Edition, Kindle Edition by S. N. Piramanayagam, Tow C. Chong.
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Term 6

Module name:	Probability and Statistics																																																
Code																																																	
Trimester	6																																																
Person responsible for the module	Assoc. Prof. M. Sergazyev, PhD																																																
Lecturer(s)	A.Zhailaubek, M.Sc. A.Amanbekkyzy, M.Sc.																																																
Language	English																																																
Relation to curriculum	Bachelor programmes: Big Data Analysis, Software Engineering, IT Management, Computer Science. Compulsory course.																																																
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																																
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>5</td><td>30</td><td>20</td><td>10</td><td>90</td><td>150</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	5	30	20	10	90	150																														
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5	30	20	10	90	150																																												
Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td rowspan="4">1st attestation</td><td>Problem Sets</td><td>30</td><td>Submission of written reports</td><td>Weekly</td></tr><tr><td>Quiz</td><td>30</td><td>Written</td><td>3rd week</td></tr><tr><td>Mid-term Exam</td><td>40</td><td>Written</td><td>5th week</td></tr><tr><td>1st attestation total</td><td>100</td><td></td><td></td></tr><tr><td rowspan="4">2nd attestation</td><td>Problem Sets</td><td>30</td><td>Submission of written reports</td><td>Weekly</td></tr><tr><td>Quiz</td><td>30</td><td>Written</td><td>8th week</td></tr><tr><td>End-term Exam</td><td>40</td><td>Written</td><td>10th week</td></tr><tr><td>2nd attestation total</td><td>100</td><td></td><td></td></tr><tr><td colspan="2">Final Exam</td><td>100</td><td>Written</td><td>During final exam session</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Problem Sets	30	Submission of written reports	Weekly	Quiz	30	Written	3 rd week	Mid-term Exam	40	Written	5 th week	1st attestation total	100			2nd attestation	Problem Sets	30	Submission of written reports	Weekly	Quiz	30	Written	8 th week	End-term Exam	40	Written	10 th week	2nd attestation total	100			Final Exam		100	Written	During final exam session
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Final Exam		100	Written	During final exam session																																													

	<div>Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100.$</div>
Requirements according to the examination regulations	<p>Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>
Recommended prerequisites	Linear Algebra, Calculus I, Calculus II, Discrete mathematics.
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • Graphical displays for simple data sets, the central measures and spread of data; • Probability of various events; concepts of mutually exclusive events; • Conditional probabilities, multiplication rule, and Bayes theorem; • Concepts of random variables, probability distributions, expected value and variance and their use in developing statistical inference tools; • Concept of a sampling distribution and its use in statistical inference for population parameters; • Intervals of confidence for population parameters; • Hypothesis testing, including a Chi-Square test of independence, and concept of P-values in hypothesis testing; • Estimating the regression line based on some data. <p>Students will have the skill to</p> <ul style="list-style-type: none"> • draw correct inferences from data sampling; • construct confidence intervals and formulate hypothesis tests involving population means, proportions and variance; • formulate appropriate statistical hypotheses, and to correctly interpret statistical statements; • Describe a type I and type II error and the role these errors play in interpreting results. • measure the strength and direction of a linear relationship with correlation. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • Critically evaluate the data and information; • Use various test statistics to assess the significance of a model; • Employ confidence interval and regression analysis to construct a predictive model; • Use statistical techniques in decision making; • Interpret the results of statistical analysis to real world problems in different areas of application.
Content	This course covers the fundamental statistical concepts and is related to the computer science engineering. Topics include: descriptive statistics; probability and random variables; sampling; statistical distributions; confidence intervals; hypothesis testing; regression.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.

Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Walpole, Myers, Myers, Ye. Probability and Statistics for Engineers and Scientists. 9th edition. 2016, Pearson. 2. Sheldon Ross. Introduction to Probability and Statistics for Engineers and Scientists. 5th edition. 2014, Elsevier. 3. Sheldon Ross. First Course in Probability. 10th edition. 2019, Pearson Education. <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. L. Wasserman. All of Statistics. Springer, 2005 2. Lange, Applied Probability. Springer, 2015 3. Jobson: Applied Multivariate Data Analysis, Volume I: Regression and Experimental Design.
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Module name:	Computer Networks					
Code						
Trimester	6					
Person responsible for the module	Kuat Beisekeyev Aigerim Kalikova Balzhan Azibek					
Lecturer(s)	Kuat Beisekeyev, MSc Aigerim Kalikova, MSc Laura Aldasheva, Candidate Technical Sciences Balzhan Azibek, M.Sc.					
Language	English					
Relation to curriculum	Bachelor programs: Software Engineering, Computer Science Compulsory course.					
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.					
Workload of course components and credits per trimester						
	ECTS credits	Contact hours		ISIS	SIS	Total hours
		Lectures	Practice sessions			
	5	30	20	10	90	150
Course assessment and forms of examination						
	Period	Assessment type	Number of points	Exam Form		Schedule (Week #)
	1 st attestation	Assignments	70	Submission of written reports		Weekly
		Mid-term Exam	30	Written		5 th week
		1 st attestation total	100			
2nd attestation	Assignments	70	Submission of written reports		Weekly	

	End-term Exam	30	Written	10 th week
	2 nd attestation total	100		
	Final Exam	100	Written	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100$.			
Requirements according to the examination regulations	<p>Course and university policies include:</p> <p>Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).</p> <p>Late submissions are not accepted.</p> <p>No cheating, duplication, falsification of data, plagiarism, and crib</p> <p>Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>			
Recommended prerequisites	<p>Prerequisite for this course is an intermediate level of understanding of personal computers and operating systems equivalent to the A + / IT Fundamentals levels.</p> <ul style="list-style-type: none"> • Basic computer literacy • Basic PC operating system navigation skills • Basic internet usage skills • Introduction to Programming (Java, Python, C++) 			
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • Common network components, architectures, and designs • IPv4 and IPv6 structure, basic and advanced subnetting • Ethernet switching technologies, Virtual LANs, STP • OSI and TCP/IP layers in detail to understand their functions and services <p>Students will have the skills to:</p> <ul style="list-style-type: none"> • understand both the practical and conceptual skills to design and analyze computer communication networks. • build small and medium scale network topologies • perform configurations for routers and switches • examine IPv4 and IPv6 structure, basic and advanced subnetting and implement IP addressing schemes • cover Ethernet switching technologies, Virtual LANs, STP • understand Network automation tools and latest Cisco products <p>In terms of Competences, students will be able to:</p>			

	<ul style="list-style-type: none"> • Critical Thinking: In the assignments, students are asked to evaluate the data and information critically; solve complex technical problems and challenging tasks and manage the issues. • Problem-solving: Students demonstrate proficiency in managing network essentials requirements on Packet Tracer. • Result-Orientation: Students improve the performance of networking devices and their security on virtual machines or using packet tracer tools. • Documentation: Students learn how to understand different documents as well as standards. • Teamwork, collaboration, and communication: Students improve creative research and teamwork skills by performing individual/group assignments. • Career hard skills: Students learn relevant popular tools used in practice. • Research skills: The course uses elements of ROS for students to advance their interpretation and research skills.
Content	<p>This course covers the fundamental building blocks that form a modern network, such as protocols, topologies, hardware, and network operating systems. Moreover, to provide in-depth coverage of the most important concepts in contemporary networking, such as TCP/IP, Ethernet, wireless transmission, and security.</p> <p>Topics include:</p> <p>Week 1 – Networking today;</p> <p>Week 2 – Cisco IOS;</p> <p>Week 3 – Network Protocols and models;</p> <p>Week 4 – Physical Layer Protocols and Data Link Layer Protocols;</p> <p>Week 5 – Ethernet Protocols and ARP;</p> <p>Week 6 – Network Layer Protocol;</p> <p>Week 7 – IPv4, Ipv6 Network Addresses;</p> <p>Week 8 – Subnetting an IPv4 Network;</p> <p>Week 9 – Transport Layer;</p> <p>Week 10 – Application Layer Protocols and QOS.</p>
Media employed	Multimedia classrooms equipped with computer, projection, and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Computer Networks, Global Edition 6th Edition 2021- Andrew Tanenbaum, David Wetherall. 2. Computer Networks: A Systems Approach (The Morgan Kaufmann Series in Networking) 6th Edition 2021- Larry L. Peterson, Bruce S. Davie. <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. Computer Networking: A Top-Down Approach, 6Th Edn, 2021 2. Mayers Mike. CompTIA A+ Certification: All-in-One Exam Guide/ M. Mayers, S. Jernigan. - 10 ed. - San Francisco: McGraw-Hill Education, 2019. - 1524 p. - ISBN 978-1-260-45403-1: 25500.00. 004 - K64.

	<p>3. Gary A. Donabue – Network Warrior, Second Edition Cisco Networking Academy Program CCNA 1 and 2 Companion Guide CCNA 200-301 Official Cert Guide Volume 1. James F. Kurose, Keith W. Ross-Computer Networking: A Top-Down Approach, 6Th Edn, 2021</p> <p>4. Online journals, article, papers, books, and internet resources</p>
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Module name:	Capstone project																																			
Code																																				
Trimester	6																																			
Person responsible for the module	Elvira Aitmukhanbetova, senior lecturer Gulnur Shuteyeva, senior lecturer																																			
Lecturer(s)	G.Shuteyeva, senior lecturer																																			
Language	English																																			
Relation to curriculum	Bachelor programmes: Big Data Analysis, Software Engineering, IT Management. <i>(Programmes under accreditation are listed)</i> Compulsory course.																																			
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																			
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>5</td><td>30</td><td>20</td><td>10</td><td>90</td><td>150</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	5	30	20	10	90	150																	
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5	30	20	10	90	150																															
Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td rowspan="5">1st attestation</td><td>Topic (plan)</td><td>20</td><td>Submission of written reports</td><td>Weekly</td></tr><tr><td>Project proposal</td><td>20</td><td></td><td>3rd week</td></tr><tr><td>Weekly progress (week 1- 4)</td><td>20</td><td></td><td>4th week</td></tr><tr><td>Progress report</td><td>40</td><td></td><td>5th week</td></tr><tr><td>1st attestation total</td><td>100</td><td></td><td></td></tr><tr><td>2nd attestation</td><td>Weekly progress (week 6- 9)</td><td>20</td><td>Submission of written reports</td><td>Weekly</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Topic (plan)	20	Submission of written reports	Weekly	Project proposal	20		3 rd week	Weekly progress (week 1- 4)	20		4 th week	Progress report	40		5 th week	1st attestation total	100			2nd attestation	Weekly progress (week 6- 9)	20	Submission of written reports	Weekly
Period	Assessment type	Number of points	Exam Form	Schedule (Week #)																																
1 st attestation	Topic (plan)	20	Submission of written reports	Weekly																																
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2nd attestation	Weekly progress (week 6- 9)	20	Submission of written reports	Weekly																																

	Progress report	40		8 th week
	Final presentation	20		9 th week
	Team evaluation	20		
	2nd attestation total	100		10 th week
	Final paper	100		During final exam session
Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final				
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.			
Recommended prerequisites	Research Method and tools			
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • design a solution to a significant open-ended problem in telecommunication. • design, implement, debug, and test created system that address the selected problem using the skills learned in previous courses; • choose appropriate theories and techniques to address the problem; • select an appropriate evaluation methodology to confirm that the solution meets the design goals; • document and present (using written, oral and visual means) the design process and the results of a proposed solution to the selected problem. <p>Students will have the skill to:</p> <ul style="list-style-type: none"> • Critically reason and analyze a reasonably complex problem; • Use research methodologies in solving complex problems; • Use appropriate research tools, resources and technologies; • Differentiate between qualitative and quantitative methods in research; • Prepare project paper, presentation. <p>In terms of competences, students will be able to:</p> <ul style="list-style-type: none"> • address a theoretical, practical, real-world challenge; • implement the planned activity as a team; • select, collect and use required information/knowledge to solve the identified problem; • design a solution to a significant open-ended problem in telecommunication; • design, implement, debug, and test created system that address the selected problem using the skills learned in previous courses; • take appropriate decisions based on collected and analyzed information; 			

	<ul style="list-style-type: none"> • prepare project report after performing due plagiarism check using appropriate tools; • function effectively in teams.
Content	This course covers the fundamental statistical concepts and is related to the computer science engineering. Topics include: introduction to the course and policies; listing projects; project topics; project proposal; scope of the project; details of designs, working and processes; results and applications; conclusions and future scope; references and Bibliography; final presentation and final paper
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. The Capstone Guidebook: A Step-by-Step Guide to Capstone Design and Writing – by Douglas L. Blakemore, Ph.D., 2012 2. Model-Based Processing - James V. Candy, 2019 <p>Supplementary literature:</p> <ol style="list-style-type: none"> 3. Elizabeth DePoy. Introduction to Research Understanding and Applying Multiple Strategies / D. Elizabeth, N. G. Laura. - 6 ed. - USA : Elsevier Inc., 2020. - 402 p. - ISBN 978-0-323-61247-0 : 68200.00. <p>303 - D35</p>

Module name:	Research project																		
Code																			
Trimester	6																		
Person responsible for the module	Elvira Aitmukhanbetova, senior lecturer Gulnur Shuteyeva, senior lecturer																		
Lecturer(s)	G.Shuteyeva, senior lecturer																		
Language	English																		
Relation to curriculum	Bachelor programmes: Big Data Analysis, Software Engineering, IT Management. (<i>Programmes under accreditation are listed</i>) Compulsory course.																		
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																		
Workload of course components and credits per trimester	<table border="1"> <tr> <th rowspan="2">ECTS credits</th><th colspan="2">Contact hours</th><th rowspan="2">ISIS</th><th rowspan="2">SIS</th><th rowspan="2">Total hours</th></tr> <tr> <th>Lectures</th><th>Practice sessions</th></tr> <tr> <td>5</td><td>30</td><td>20</td><td>10</td><td>90</td><td>150</td></tr> </table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	5	30	20	10	90	150
ECTS credits	Contact hours		ISIS	SIS	Total hours														
	Lectures	Practice sessions																	
5	30	20	10	90	150														

Course assessment and forms of examination	<table><tr><th>Period</th><th>Assessment type</th><th>Number of points</th><th>Exam Form</th><th>Schedule (Week #)</th></tr><tr><td rowspan="3">1st attestation</td><td>Assignments</td><td>60</td><td>Submission of written reports</td><td>Weekly</td></tr><tr><td>Mid-term</td><td>40</td><td>Written</td><td>5th week</td></tr><tr><td>1st attestation total</td><td>100</td><td></td><td></td></tr><tr><td rowspan="3">2nd attestation</td><td>Assignments</td><td>60</td><td>Submission of written reports</td><td>Weekly</td></tr><tr><td>End-term</td><td>40</td><td>Written</td><td>10th week</td></tr><tr><td>2nd attestation total</td><td>100</td><td></td><td></td></tr><tr><td colspan="2">Final Exam Project</td><td>100</td><td>Manuscript and oral presentation</td><td>During final exam session</td></tr><tr><td colspan="5">Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final = 100.</td></tr></table>	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Assignments	60	Submission of written reports	Weekly	Mid-term	40	Written	5 th week	1st attestation total	100			2nd attestation	Assignments	60	Submission of written reports	Weekly	End-term	40	Written	10 th week	2nd attestation total	100			Final Exam Project		100	Manuscript and oral presentation	During final exam session	Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.				
Period	Assessment type	Number of points	Exam Form	Schedule (Week #)																																						
1 st attestation	Assignments	60	Submission of written reports	Weekly																																						
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Requirements according to the examination regulations	<p>Course and university policies include:</p> <p>Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).</p> <p>Late submissions are not accepted.</p> <p>No cheating, duplication, falsification of data, plagiarism, and crib</p> <p>Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>																																									
Recommended prerequisites	Academic Writing, Research methods and Tools																																									
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none">• paradigms that research development;• Navigate in research processes and conduct valuable research projects• Explore different ways to do research, and gain an understanding of qualitative, quantitative, and mixed-methods research• Bring the gained knowledge and skills into action for diploma works <p>Students will have the skill to</p> <ul style="list-style-type: none">• Analyze a big number of Literature Resources;• Define narrow research field;• Generate Research Question(s);• Writing Research Proposal for Chosen Research Field.• Identify Differences between qualitative and quantitative methodologies.• Use different tools for citation, for analyzing survey and future statistics. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none">• Critically evaluate the data and information;• Have a good communication among group members.• Have a problem-solving competence for solving different kind of problems;• Interpret the results of surveys (questionnaires) to some meaningful report and conclusion.																																									

Content	This course covers various concepts crucial to scientific research methodology, from the initial formulation of the problem through all the steps designing and conducting the research to the final stage of writing a report.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 2. The Essential Guide to Doing Your Research Project, 3rd edition, Zina O'Leary, SAGE Publications Ltd, 2017, ISBN-13: 978-1473952089 3. The Capstone Guidebook: A Step-by-Step Guide to Capstone Design and Writing – by Douglas L. Blakemore, Ph.D., 2012 3. Model-Based Processing - James V. Candy, 2019 <p>Supplementary literature:</p> <ol style="list-style-type: none"> 4. Elizabeth DePoy. Introduction to Research Understanding and Applying Multiple Strategies / D. Elizabeth, N. G. Laura. - 6 ed. - USA : Elsevier Inc., 2020. - 402 p. - ISBN 978-0-323-61247-0 : 68200.00.303 - D35 5. Research Methodology: Tools and Techniques, 1st edition, Dr. Prabhat Pandey, Bridge Center, 2015, ISBN-13: 976-6069350270

Module name:	Software Quality Assurance and Testing																		
Code																			
Trimester	6																		
Person responsible for the module	Balzhan Azibek, M.Sc. in ECE																		
Lecturer(s)	Gulzhas Mailybayeva, PhD Balzhan Azibek, M.Sc.																		
Language	English																		
Relation to curriculum	Bachelor programs: Software Engineering, Computer Science Compulsory course.																		
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																		
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>5</td><td>30</td><td>20</td><td>10</td><td>90</td><td>150</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	5	30	20	10	90	150
ECTS credits	Contact hours		ISIS	SIS	Total hours														
	Lectures	Practice sessions																	
5	30	20	10	90	150														
Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td rowspan="2">1st attestation</td><td>Assignments</td><td>70</td><td>Submission of written reports</td><td>Weekly</td></tr><tr><td>Mid-term Exam</td><td>30</td><td>Written</td><td>5th week</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Assignments	70	Submission of written reports	Weekly	Mid-term Exam	30	Written	5 th week
Period	Assessment type	Number of points	Exam Form	Schedule (Week #)															
1 st attestation	Assignments	70	Submission of written reports	Weekly															
	Mid-term Exam	30	Written	5 th week															

		1st attestation total	100		
	2nd attestation	Assignments	70	Submission of written reports	Weekly
		End-term Exam	30	Written	10 th week
		2nd attestation total	100		
	Final Exam		100	Written	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100$.				
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Recommended prerequisites	Introduction to Programming (Java, Python, C++)				
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • Software engineering testing and quality assurance processes • Variety of testing types, techniques, methods, and tools. • ISO standards on software quality and testing • Design concepts for system testing and execution • Learning the software quality assurance, metrics, defect prevention techniques • Differentiate test cases and scenarios • Bug life cycle and STLC phases <p>Students will have the skill to</p> <ul style="list-style-type: none"> • Maintain the bug database • Work with manual and automating tools at different levels of testing • Conduct Functional testing on Selenium Web Driver • Work with TestNG • Conduct Cross-Browser Testing: BrowserStack, SauceLabs • Implement Data-driven, Keyword-driven, Behavior-driven development frameworks. • Work with Apache POI libraries, RestAssured, JDBC, Wiremock, Log4j • Conduct Database testing: JMeter • Conduct API testing: Postman • Conduct Acceptance testing: Cucumber <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • Critical Thinking: In the assignments, students are asked to critically evaluate the data and information; solve complex technical problems and challenging tasks and manage the issues. • Problem-solving: Student demonstrate proficiency in managing a software project to customer requirements. 				

	<ul style="list-style-type: none"> • Result-Orientation: Students improve software product and its security, cost-effectiveness, customers' satisfaction. • Documentation: Students learn how to understand different documents as well as standards, also write test reports and test strategies. • Teamwork, collaboration, communication: Improve creative research and teamwork skills by performing individual/group assignments. • Career hard skills: Students learn different relevant popular tools used in practice. • Research skills: Course uses elements of ROS for students advance their interpretation and research skills.
Content	<p>This course covers the various approaches and method used in software testing and quality assurance. Topics include:</p> <p>Week 1 – Fundamentals of software quality assurance. Types of testing (functional and non-functional, black box-white box, sanity, smoke, regression). Bugs life cycle, Bug report</p> <p>Week 2 – STLC. Test Planning. Test Preparation. Test Execution. Reporting. Testing Strategies: Pyramid Test Strategy. Ice-cream cone anti-strategy. Agile Quadrant Strategy. Honeycomb Strategy.</p> <p>Week 3 –UI Test Automation with Selenium WebDriver Framework. Locating Elements. Selenium WebDriver setup. Build Management tool/ Maven. Browser Setups. Advanced Locators: xpath and css selectors. Dynamic elements. Locating Dynamic Table Elements. WebDriver setup</p> <p>Week 4 –Advanced Selenium WebDriver Framework: Wait types. Switch Window and iFrames. Working with Action Class. Working with Select Class. Key Press Events</p> <p>Week 5 –TestNG Setup. Annotations and asserts. Parameters and Parallels. ITestResult. Listeners. Reporters. Logging Infrastructure. Using Log4j2. Extent Reports. Allure Reports. Screenshots</p> <p>Week 6 – Cross-Browser Testing. BrowserStack. SauceLabs. Data Driven Development. Keyword-Driven Development Framework Setup. Apache POI. Apache MetaModel</p> <p>Week 7 –Database Testing. JDBC Library connection. ETL Testing. Database Migration Testing. Performance Testing. JMeter</p> <p>Week 8 – Behavior Driven Development Framework. Cucumber. Gherkin. Feature Files. Step definitions. Hooks. Scenario and Scenario Outline. Data Tables. Switching to BDD Framework.</p> <p>Week 9 – API Testing. CRUD operations. Status Codes. REST API vs SOAP API. JSON, XML data types. Swagger UI. Postman Tool for API. Postman Collections. RestAssured Library Setup for API Test Automation.</p> <p>Week 10 – Microservices Architecture Testing. Isolated Testing. Integrated Testing. Mocking and Stubbing. WireMock Framework Setup with Junit5. CI/CD Setup. Jenkins</p>
Media employed	Multimedia classrooms equipped with computer, projection, and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Kshirasagar Naik and Priyadarshi Tripathy, Software Testing and Quality Assurance, Theory and Practice, published by John Wiley & Sons, Inc, 2008 2. Daniel Galin, Software Quality Assurance, From theory to implementation, published by Pearson Education Limited, 2004 <p>Supplementary literature:</p> <p>- Online journals, article, papers, books, and internet resources</p>

Module name:	Software Architecture																																																					
Code																																																						
Trimester	6																																																					
Person responsible for the module	O. Kazhybayev, MSc. in Advanced Software Engineering																																																					
Lecturer(s)	O. Kazhybayev, MSc. in Advanced Software Engineering																																																					
Language	English																																																					
Relation to curriculum	Bachelor programs: Computer science, Software engineering. Compulsory course.																																																					
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																																																					
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Requirements according to the examination regulations	<p>Course and university policies include:</p> <p>Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).</p> <p>Late submissions are not accepted.</p> <p>No cheating, duplication, falsification of data, plagiarism, and crib</p> <p>Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>
Recommended prerequisites	none
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • Use Case and prioritizing, mitigating risks • Software development processes • Project Risk Assessment and analysis of architectural diagrams; • Creating an Effective Encapsulation, building an encapsulated interfaces; • Consolidating the Model and Diagramming the Components; • Creating Domain, Information, Design models; • Architectural styles and architecture-focused design; • Modeling existing systems <p>Students will have the skill to</p> <ul style="list-style-type: none"> • Draw simple UML meta-models and profiles; • Choose efficient techniques in risk-driven architecture; • Make rational architecture choices at the stage of modelling; • Describe different functionality scenarios; • Determine the difference between architectural styles <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • Provide a detailed specification of a system with UML diagrams; • Apply architectural styles in the process of modeling; • Create models of existing systems • Use standard architectural abstractions; • Predict the results of functionality scenarios.
Content	<p>This course introduces basic concepts and principles about software design and software architecture. It starts with discussion on design issues, followed by coverage on design patterns. It then gives an overview of architectural structures and styles. Practical approaches and methods for creating and analyzing software architecture are presented. The emphasis is on the interaction between quality attributes and software architecture. Students will also gain experiences with examples in design pattern application and case studies in software architecture.</p>
Media employed	<p>Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.</p>
Reading list	<p>Basic Literature:</p> <p>6. Just Enough Software Architecture: A Risk-Driven Approach by George Fairbanks, Marshall & Brainerd Publishers, 2010</p>

Module name:	Industrial practice															
Code																
Trimester	6															
Person responsible for the module	7. Yersultan Tulebayev															
Lecturer(s)	8. Aigerim Tulegenova 9. Ruslan Omirgaliyev 10. Zhibek Sarsenova 11. Sandibek Umirov 12. Yersultan Tulebayev 13. Yspenbetova Dana															
Language	English															
Relation to curriculum	Bachelor programmes: Software Engineering, Computer Science. (Programmes under accreditation are listed)															
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.															
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ECTS credits	Contact hours		ISIS	SIS												
	Lectures	Practice sessions														
4	0	0	1 week	3 weeks												
Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Total</td></tr><tr><td>Attestation</td><td>Presentation of the report on the results on industrial practice.</td><td>100</td><td>100</td></tr></table>				Period	Assessment type	Number of points	Total	Attestation	Presentation of the report on the results on industrial practice.	100	100				
Period	Assessment type	Number of points	Total													
Attestation	Presentation of the report on the results on industrial practice.	100	100													
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.															

Recommended prerequisites	<p>For the successful completion of the Industrial Practice, students must have a set of competencies according to the profile of the educational program, among which for:</p> <ul style="list-style-type: none"> • Software Engineering (SE) - ability to program(code) and build software applications; • Computer Science (IT) - ability to work with the hardware of computer systems, software (information systems) and computer networks.
Module objectives/intended learning outcomes	<p>Course objectives include but no limited:</p> <ul style="list-style-type: none"> • to provide comprehensive learning platform to students where they can enhance their employ ability skills and become job ready along with real corporate exposure; • to enhance students' knowledge in one particular technology; • to increase self-confidence of students and help to find their own proficiency; • to cultivate student's leadership ability and responsibility to perform or execute the given task; • to provide learners hands on practice within a real-world problems and projects. <p>Students will have the skill to</p> <p>The skills and competencies that will be achieved after the Industrial Practice include but not limited to understanding of practical applications of many information and communication technology concepts and approaches depending on the educational program.</p> <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • Identify skills and capabilities that intersect effectively with the needs of industry. • Apply and practice good communication skills in the workplace setting. • Reflect and evaluate on experiences that might lead to future employment. • Report research findings in written and verbal forms. • Demonstrate and apply research skills to complete project.
Content	<p>Industrial Practice is a regular study requirement, representing a compulsory part of the educational program. Industrial Practice must enable students to integrate rapidly, and productively into the work process at a future employer, to learn the basic business functions and organization of the company, to build upon and enhance theoretical and practical knowledge acquired through study and to perform work independently and under a mentor in specific fields of information and communication technologies.</p>
Media employed	<p>Multimedia classrooms equipped with computer, projection, and audio system; Whiteboard; Microsoft Teams; LMS Moodle.</p>
Reading list	<p>Professional books depend on field of practice. Some literature might be available on Scientific Library at Astana IT University (https://astanait.edu.kz/en/library-2/).</p> <p>Generally, no special readings needed but it is strongly recommended to read all literature that was asked to read by the company.</p>

Term 7

Module name:	Psychology																											
Code																												
Trimester	6																											
Person responsible for the module	Assoc. Prof. A.Issakhanova, PhD																											
Lecturer(s)	Issakhanova Assel Alimakhanovna PhD in Pedagogy and psychology Belessova Nursulu MA in Pedagogy and psychology																											
Language	English																											
Relation to curriculum	Bachelor programmes: all educational programmes																											
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																											
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>2</td><td>10</td><td>10</td><td>10</td><td>30</td><td>60</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	2	10	10	10	30	60									
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Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td rowspan="3">1st attestation</td><td>Problem Sets</td><td>60</td><td>Submission of written reports</td><td>Weekly</td></tr><tr><td>Mid-term Exam</td><td>40</td><td>Written. Individual project</td><td>5th week</td></tr><tr><td>1st attestation total</td><td>100</td><td></td><td></td></tr><tr><td>2nd attestation</td><td>Problem Sets</td><td>60</td><td>Submission of written reports</td><td>Weekly</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Problem Sets	60	Submission of written reports	Weekly	Mid-term Exam	40	Written. Individual project	5 th week	1 st attestation total	100			2nd attestation	Problem Sets	60	Submission of written reports	Weekly
Period	Assessment type	Number of points	Exam Form	Schedule (Week #)																								
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	1 st attestation total	100																										
2nd attestation	Problem Sets	60	Submission of written reports	Weekly																								

		End-term Exam	40	Written. Individual project	10 th week
		2nd attestation total	100		
	Final Exam		100	Quiz	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100$.				
Requirements according to the examination regulations	<p>Course and university policies include:</p> <p>Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).</p> <p>Late submissions are not accepted.</p> <p>No cheating, duplication, falsification of data, plagiarism, and crib</p> <p>Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>				
Recommended prerequisites	Self-knowledge; Cultural Studies.				
Module objectives/inten ded learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • reading and understanding a range of psychological text; • understanding personal characteristics and needs; • describing ethical principles that guide psychologists in research and therapy. <p>Students will have the skill to:</p> <ul style="list-style-type: none"> • applying psychological principles to everyday life. • drawing appropriate, logical, and objective conclusions about behavior and mental processes from empirical evidence. • evaluating misconceptions or erroneous behavioral claims based on evidence from psychological science. • use psychological skills in communication; • develop emotional intelligence; • find the features of communication and use them in the relationship. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • apply self-regulation methods; • select and use reference materials in psychology; • work with psychological person's health and stress resistance. 				
Content	This course provides an introduction to psychology for majors in IT related majors. Topics given major consideration include maturation and				

	development, motivation, emotion, personality, mental health, intelligence, aptitude, social influence, attitudes, beliefs, and vocational adjustments.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 7. Douglas A. Kleiber. Series: Social Psychology Research Progress. Hauppauge : Nova. 2020. 8. Educational Psychology. By: Zeryl Joy M. Fiscal. Oakville, ON : Society Publishing. 2019. 9. Pedro F. Bendassolli. Series: Advances in Cultural Psychology: Constructing Human Development. Charlotte, NC : Information Age Publishing. 2019. 10. Looij, August van. Series: Psychology of Emotions, Motivations and Actions. New York : Nova. 2019. 11. Industrial Organisational Psychologists Engaging with the New World of Work. SIOPSA; Theo H Veldsman; et al. [S.l.] : KR Publishing. 2021. 12. Campbell. Series: Psychology of Emotions, Motivations and Actions. New York : Nova Medicine and Health. 2021. 13. Social Psychology: Handbook of Basic Principles / Van Lange A.M. Paul, H.E. Tory, W. A. Kruglanski. - New York : The Guilford Press, 2021. 14. Psychology [Text] / G.M. David, C. Nathan DeWall. - 13 ed. - New York : Macmillan International Higher Education, 2021 15. Susan W. Weinschenk. 100 Things Every Designer Needs To Know About People / W. W. Susan. - USA : Pearson, 2020 <p>Supplementary literature:</p> <ol style="list-style-type: none"> 6. Douglas A. Kleiber. Series: Social Psychology Research Progress. Hauppauge : Nova. 2020. 7. Educational Psychology. By: Zeryl Joy M. Fiscal. Oakville, ON : Society Publishing. 2019. 8. Pedro F. Bendassolli. Series: Advances in Cultural Psychology: Constructing Human Development. Charlotte, NC : Information Age Publishing. 2019. 9. Looij, August van. Series: Psychology of Emotions, Motivations and Actions. New York : Nova. 2019. 10. Industrial Organisational Psychologists Engaging with the New World of Work. SIOPSA; Theo H Veldsman; et al. [S.l.] : KR Publishing. 2021. 11. Campbell. Series: Psychology of Emotions, Motivations and Actions. New York : Nova Medicine and Health. 2021. 12. Social Psychology: Handbook of Basic Principles / Van Lange A.M. Paul, H.E. Tory, W. A. Kruglanski. - New York : The Guilford Press, 2021.

	13. Psychology [Текст] / G.M. David, C. Nathan DeWall. - 13 ed. - New York : Macmillan International Higher Education, 2021 14. Susan W. Weinschenk. 100 Things Every Designer Needs To Know About People / W. W. Susan. - USA : Pearson, 2020
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Module name:	Blockchain Technologies																																							
Code																																								
Trimester	7																																							
Person responsible for the module	Senior-Lecturer, Yerasyl Amanbek, MSc																																							
Lecturer(s)	Yerasyl Amanbek, MSc Magzhan Ikram, M.Sc.																																							
Language	English																																							
Relation to curriculum	Bachelor programmes: Software Engineering, Computer Science. Elective course.																																							
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																																							
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Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td rowspan="4">1st attestation</td><td>Assignment 1</td><td>30</td><td>Submission of works</td><td>Week 1-2</td></tr><tr><td>Assignment 2</td><td>30</td><td>Submission of works</td><td>Week 3-4</td></tr><tr><td>Mid-term Exam</td><td>40</td><td>Written</td><td>5th week</td></tr><tr><td>1st attestation total</td><td>100</td><td></td><td></td></tr><tr><td rowspan="3">2nd attestation</td><td>Assignment 3</td><td>30</td><td>Submission of works</td><td>Week 6-7</td></tr><tr><td>Assignment 4</td><td>30</td><td>Submission of works</td><td>Week 8-9</td></tr><tr><td>End-term Exam</td><td>40</td><td>Written</td><td>10th week</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Assignment 1	30	Submission of works	Week 1-2	Assignment 2	30	Submission of works	Week 3-4	Mid-term Exam	40	Written	5 th week	1st attestation total	100			2nd attestation	Assignment 3	30	Submission of works	Week 6-7	Assignment 4	30	Submission of works	Week 8-9	End-term Exam	40	Written	10 th week
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		2nd attestation total	100		
	Final Exam		100	Written	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100$.				
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Recommended prerequisites	Algorithms and Data Structures, Object Oriented Programming, Web technologies				
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • Smart-contracts development in Solidity • How blockchains work • Different type of blockchains and consensus • Blockchain Scaling solutions (L2) • Building decentralized applications (dapps) • Decentralized Finances (DEFI) • Solidity Standards (openzeppelin) • Architecture of Blockchain Applications (dapps) • ERC20 and ERC721 standards • Concepts of Providers, Signers, Approval Flows and ABIs • Zero-Knowledge Proofs • Decentralized storages (IPFS) • Blockchain Oracles (Chainlink) • Blockchain Indexing (Graph) • Frontend libraries for web3: ethers.js • Smart-contract development tools: hardhat <p>Students will have the skill to</p> <ul style="list-style-type: none"> • Develop smart-contracts in solidity • Develop full-stack decentralized applications (Dapps) • Build popular dapps: NFT-minters, NFT-marketplaces, Staking, Decentralized Exchanges, GameFi, Soulbound Tokens, etc. • Use decentralized storage solutions like IPFS • Develop using modern web3 development technologies such as: hardhat, ethers.js, Chainlink, Graph, IPFS, etc. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • Integrate blockchain technologies in web2 applications • Understand feasibility of integration of decentralized tools in apps • Automate financial flows using web3 technologies • Implement decentralized storage for applications • Index logs in the blockchain using GraphQL • Apply stochastic nature to deterministic nature of blockchain using blockchain oracles 				

	<ul style="list-style-type: none"> Build full-stack decentralized applications (dapps)
Content	This course covers the fundamental blockchain technologies and decentralized applications. Topics include: Blockchain Fundamentals and Consensus, smart-contract development, building decentralized applications, connection to blockchain using providers, ERC20 and ERC721 standards, Ethers.js library, building DEFI applications, Chainlink, GraphQL, upgradable smart-contracts.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Vitalik Buterin, Ethereum Whitepaper. 2014 2. Satoshi Nakamoto, Bitcoin Whitepaper. 2008 3. Uniswap, Decentralized Exchange whitepaper. 2018 <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. Building decentralized applications. Learnweb3, 2021 2. Solidity by example. Solidity, 2020 3. Openzeppelin, Smart contract standards, 2020 4. Buildspace, Decentralized Autonomous Organizations, 2021

Module name:	Technological Entrepreneurship					
Trimester	8					
Person responsible for the module	Assel Nurguzhina; Aigerim Zuyeva					
Language	English					
Relation to curriculum	Bachelor programmes: Software Engineering, Computer Science. Elective course.					
Teaching methods	<ul style="list-style-type: none">- Class discussions- Individual additional literature assessment- Presentations- Research analysis presentation- Gamified tasks during practice sessions					
Workload (incl. contact hours, self-study hours)	ECTS credits	Contact hours		ISIS	SIS	Total hours
		Lectures	Practice sessions			
	5	20	30	10	90	150
Credit points						
Required and recommended prerequisites for joining the module	Project Management (task decomposition, assignment), Financial management (cost-benefit analysis)					

Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • science-based research and technological breakthroughs can be transformed into new business; • the frontier of current knowledge when it comes to creating value from technological inventions and managing early-stage commercialization processes; • technical expertise with business, finance and leadership skills to become a technology leader or entrepreneur. • recognizing technology trends, align business needs and technology strategy, make business cases that justify investments. • have specific knowledge of the business, play social roles and remain skillful, creative, passionate, motivative, optimistic, persuasive, flexible, resourceful, assume risk, excellent planner and problem solver. <p>Students will have the skill to</p> <ul style="list-style-type: none"> • have the requisite competencies such as attitudinal, intellectual, behavioral and managerial to be able to create business value in today's economy <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • Understand all stages of technology entrepreneurship • Interpret the peculiarities of the global project development in accordance with national approaches. • consistently pass all steps from the identification of entrepreneurial perspectives, the building of innovative processes in the organization, the development of an innovative organization, creating strategies for the technology business, evaluation of technological innovations, leadership development and constructive communication to planning finance and business models of technology entrepreneurship.
Requirements according to the examination regulations	<p>Requirements for successfully passing the module e.g. the final grade in the module is composed of 60% performance on exams, 40% take-home assignments, bonuses of in-class participation. Students must have a final grade of 60% or higher to pass</p>

Reading list	<p>Assigned reading materials and presentations should be read prior to class. Class lectures and discussions will proceed with supplemental and advanced topics, which could be difficult to understand unless students have read the assigned material. Readings are listed in the schedule section. All necessary updates and / or changes to the course will be reflected in the Learning Management System (moodle.astanait.edu.kz).</p> <p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Eric Ries. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses Crown Business, 2011, ISBN-13: 978-0307887894 2. Alexander Osterwalder & Yves Pigneur Business Model Generation/ An amazing crowd of 470 practitioners from 45 countries\Copyright © 2010 by Alexander Osterwalder. All rights reserved. Published by John Wiley & Sons, Inc., Hoboken, New Jersey. Published simultaneously in Canada. ISBN: 978-0470-87641-1 Printed in the United States of America 2018 <p>Supplementary literature:</p> <ol style="list-style-type: none"> 3. Ash Maurya. Running Lean: Iterate from Plan A to a Plan That Works (Lean (O'Reilly)) 2nd O'Reilly Media; 2nd edition (March 20, 2012) ISBN-13: 978-1449305178. 4. Rob Fitzpatrick. The Mom Test: How to talk to customers & learn if your business is a good idea when everyone is lying to you. CreateSpace Independent Publishing Platform; 1st edition (September 10, 2013), ISBN-13: 978-1492180746. 5. Ian Chaston (2017). Technology Entrepreneurship. Technology-driven vs market-driven entrepreneurship; 6. Tony Bailetti (2012). Technology Entrepreneurship: Overview, Definition and distinctive aspects; Ian Chaston (2017). Technology Entrepreneurship. Technology-driven vs market-driven entrepreneurship; 7. Richard Florida and Martin Kenney (1988) Venture capital and high technology entrepreneurship. Journal of Business Venturing; 8. Ross Brown and Collin Mason (2014) Inside the high-tech black box: A critique of technology entrepreneurship policy;
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Module name:	Academic Writing
Code	
Trimester	7/8
Person responsible	Fariza Tolesh Aigerim Urazbekova

for the module	Aliya Ayazbayeva Elmira Gerfanova																																														
Lecturer(s)	Fariza Tolesh Aigerim Urazbekova Aliya Ayazbayeva Elmira Gerfanova																																														
Language	English																																														
Relation to curriculum	6B06101 - Computer Science; 6B06201 - Telecommunication Systems; 6B06301 – Cybersecurity; 6B04101 - IT Management; 6B06102 – Software Engineering; 6B06103 – Big Data Analysis; 6B06105 – Industrial Automation; 6B06105 – Media Technologies; 6B03201 - Digital Journalism.																																														
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																														
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lecture s</td><td>Practice sessions</td></tr><tr><td>5</td><td>20</td><td>30</td><td>10</td><td>90</td><td>150</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lecture s	Practice sessions	5	20	30	10	90	150																												
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	Final exam*	Final TEST	40		TBA
	Total	0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final			
Requirements according to the examination regulations	<p>Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>				
Recommended prerequisites	C1 level English				
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in:</p> <ul style="list-style-type: none"> identifying the relevant sources for the diploma thesis research describing the context of the research based on the sources defining the main concepts of the diploma thesis research critically evaluating various contexts <p>Students will have the skills to:</p> <ul style="list-style-type: none"> effectively summarize and analyse academic texts while identifying and highlight their main ideas and messages develop independent perspectives and arguments via successful incorporation of research sources paraphrase information from sources effectively and accurately explain the diploma thesis problem and significance formulate the research question of the thesis compare the ideas from the sources determine the research gap in the chosen field examine databases to find appropriate academic sources develop abilities as critical thinkers, readers and writers develop an understanding of the demands of academic research at AITU strengthen the ability to write texts using academic language using the process approach integrate different academic sources summarize information from academic sources, distinguishing between main ideas and details <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> developing their own voice and creating a balance between their own voice and source summaries apply the conventions of APA referencing style 7th edition and be aware of how to avoid plagiarism discover scientific databases to locate appropriate academic sources, evaluate those sources and integrate them thoughtfully, responsibly, and ethically in their own thesis writing connect the ideas from academic sources to build the background of the diploma research assess peers' papers following the assessment criteria rubric evaluate the relevant theories and methods convince the reader of the significance of the diploma research 				

	<ul style="list-style-type: none"> justify the choice of theories and methods of the diploma research
Content	<p>Academic Writing is designed to help students focus on skills in academic writing for thesis research, reading and speaking with an emphasis on the rules of academic English style, research and academic vocabulary and academic language use. This syllabus is developed in accordance with the Education program of the BA degree in Computer Science, Telecommunication Systems, Cybersecurity, IT Management, Digital Journalism, Media Technology, Big Data, Software Engineering and Industrial Automation. At the end of the course students will be able to successfully apply their knowledge and skills in academic English, demonstrate their academic English language competence, and meet the Astana IT University coursework assignments.</p>
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p><u>Basic Literature:</u></p> <ul style="list-style-type: none"> Методические указания к выполнению дипломных работ в ТОО “ASTANA IT UNIVERSITY” https://moodle.astanait.edu.kz Paterson, K., & Wedge, R. (2018). Oxford Grammar for EAP: English grammar and practice for Academic Purposes. Oxford university press. <p><u>Supplementary literature:</u></p> <ul style="list-style-type: none"> Lazar, J., Feng, J. H., & Hochheiser, H. (2017). Research methods in human-computer interaction. Morgan Kaufmann. Pickard, A. J. (2013). Research methods in information. Facet publishing. Taylor & Francis Journals Standard Reference Style Guide: American Psychological Association, Seventh Edition (APA-7) Bottomley, J. (2021). Academic writing for international students of science. Routledge.

Module name:	Machine Learning Algorithms
Code	
Trimester	7
Person responsible for the module	Akhmetov Timur, PhD
Lecturer(s)	Akhmetov Timur, PhD
Language	English
Relation to curriculum	<p>Bachelor programmes: Software Engineering, Computer Science</p> <p>Compulsory course.</p>
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>
Workload of	

course components and credits per trimester	ECTS credits	Contact hours		ISIS	SIS	Total hours
		Lectures	Practice sessions			
	5	30	20	10	90	150
Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	
	1 st attestation	Problem Sets	30	Submission of written reports	Weekly	
		Quiz	30	Written	3 rd week	
		Mid-term Exam	40	Written	5 th week	
		1st attestation total	100			
	2nd attestation	Problem Sets	30	Submission of written reports	Weekly	
		Quiz	30	Written	8 th week	
		End-term Exam	40	Written	10 th week	
		2nd attestation total	100			
	Final Exam		100	Written	During final exam session	
	Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.					
	Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Requirements according to the examination regulations	The exam will take the form of a test. The test consists of 16 questions. The allocated time for the test is 30 minutes.					
Recommended prerequisites	Linear Algebra, Calculus I, Calculus II, Discrete mathematics, Machine learning algorithms, Object oriented programming, Algorithms and data structures					
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in: <ul style="list-style-type: none">fundamental concepts and principles of machine learning, including supervised learning, unsupervised learning, reinforcement learning, and deep learning.common machine learning algorithms such as linear regression, logistic regression, decision trees, random forest, support vector machines (SVMs), clustering algorithms, and neural networks.					

	<ul style="list-style-type: none"> • mathematical and statistical foundations underlying machine learning algorithms, including probability, statistics, linear algebra, calculus, and optimization. • overfitting, underfitting, bias-variance trade-off, and methods for evaluating and improving the performance of machine learning models. • ethical implications of using machine learning algorithms, including issues of bias, privacy, and fairness. <p>Students will have the skills to</p> <ul style="list-style-type: none"> • apply machine learning algorithms to real-world problems, including choosing the appropriate algorithm, tuning parameters, and validating the model's performance. • Use programming languages (such as Python, R) and machine learning libraries (such as scikit-learn, TensorFlow, PyTorch) to implement machine learning algorithms. • preprocess and clean data, handle missing values, and perform feature extraction and selection. • use methods for evaluating and improving the performance of machine learning models, such as cross-validation and grid search. • interpret the results of machine learning models, understand their limitations, and communicate these findings to both technical and non-technical stakeholders. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • work effectively in teams, particularly in the context of data science projects that require the use of machine learning algorithms. • keep up with the rapid advances in machine learning and adapting to new tools, techniques, and paradigms. • identify the ethical implications of using machine learning algorithms in specific contexts and make decisions that respect principles of fairness, privacy, and transparency. • apply critical thinking and problem-solving skills to tackle complex, real-world problems using machine learning algorithms. • effectively communicate complex machine learning concepts and results to a variety of audiences.
Content	<p>The aim of the discipline is to provide a theoretical foundation in machine learning concepts, including a broad overview of different types of machine learning algorithms such as supervised, unsupervised, reinforcement, and deep learning algorithms. Also course is aimed to teach the practical application of these algorithms, including how to preprocess data, choose appropriate algorithms, tune parameters, evaluate model performance, and handle potential issues like overfitting or bias.</p>
Media employed	<p>Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.</p>
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 9. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow by Geron Aurelien 10. An Introduction to Statistical Learning by Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani 11. Fundamentals of Machine Learning for Predictive Data Analytics by John D. Kelleher, Brian Mac Namee, and Aoife D'Arcy 12. <p>Supplementary sources:</p> <ul style="list-style-type: none"> • https://www.simplilearn.com/tutorials/machine-learning-tutorial • https://www.geeksforgeeks.org/machine-learning/ • https://www.kaggle.com/learn/intro-to-machine-learning

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Module name:	Data visualization																																																
Code																																																	
Trimester	7																																																
Person responsible for the module	Akhmetov Timur, PhD																																																
Lecturer(s)	Akhmetov Timur, PhD																																																
Language	English																																																
Relation to curriculum	Bachelor programmes: Software Engineering – elective, Data Journalism																																																
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																																																
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Period	Assessment type	Number of points	Exam Form	Schedule (Week #)																																													
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	<div> Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100$. </div>
Requirements according to the examination regulations	The exam will take the form of a test. The test consists of 16 questions. The allocated time for the test is 30 minutes.
Recommended prerequisites	Linear Algebra, Calculus I, Calculus II, Discrete mathematics, Machine learning algorithms, Object oriented programming, Algorithms and data structures
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> principles and techniques of data visualization, including both static and interactive visualizations. various types of data visualizations, such as bar charts, line graphs, scatter plots, pie charts, histograms, and more complex forms like treemaps and parallel coordinates. color theory, layout, and design principles as they apply to data visualization. data integrity and how to represent data accurately without distortion. tools and programming languages commonly used in data visualization, such as Tableau, D3.js, and Python libraries like Matplotlib, Seaborn, and Plotly. the role of data visualization in data analysis, decision-making, and communication. <p>Students will have the skills to</p> <ul style="list-style-type: none"> choose the appropriate type of data visualization based on the nature of the data and the intended audience. use software and programming languages for creating static and interactive data visualizations. apply design principles to create clear, engaging, and effective visualizations. interpret and analyze data visualizations, including the ability to critique visualizations and suggest improvements. communicate complex data in an understandable manner through effective visualizations. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> work effectively in a team to create visualizations for data-driven projects. apply ethical considerations in data visualization, including respecting data privacy and avoiding misleading representations. engage with non-technical stakeholders, interpreting their needs, and creating visualizations that meet those needs. continuously learn and adapt to new data visualization tools and techniques as they emerge. combine data analysis, data visualization, and storytelling to inform decision-making processes.
Content	<p>Data visualization leverages the human brain's innate ability to process visual information swiftly and effectively. By transforming raw data into graphical representations, it aids in understanding complex data patterns, correlations, and trends that might be hard to discern from raw data.</p> <p>Studying data visualization helps develop data literacy, which is increasingly important in a world where data is abundant. Understanding how to read, interpret, and critique data visualizations is a crucial skill in many fields.</p>

	The discipline also involves learning to use various tools and technologies for creating visualizations, as well as design principles to make effective and aesthetically pleasing visual representations. This technical and artistic skill set is highly valuable in many roles and industries.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Effective Data Storytelling: How to Drive Change with Data, Narrative, and Visuals by Brent Dykes 2. Information Dashboard Design: Displaying Data for At-a-glance Monitoring by Stephen Few <p>Supplementary sources:</p> <ul style="list-style-type: none"> • https://www.kaggle.com/learn/data-visualization • https://www.javatpoint.com/what-is-data-visualization • https://www.codecademy.com/catalog/subject/data-visualization •

Module name:	Computer Graphics Fundamentals																		
Code																			
Trimester	7																		
Person responsible for the module	Assistant prof. A. Smaiy, PhD																		
Lecturer(s)	Assel Smaiy, PhD																		
Language	English																		
Relation to curriculum	Bachelor programmes: Computer Science.																		
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student's confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student's independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																		
Workload of course components and credits per trimester	<table border="1"> <thead> <tr> <th rowspan="2">ECTS credits</th><th colspan="2">Contact hours</th><th rowspan="2">ISIS</th><th rowspan="2">SIS</th><th rowspan="2">Total hours</th></tr> <tr> <th>Lectures</th><th>Practice sessions</th></tr> </thead> <tbody> <tr> <td>5</td><td>20</td><td>30</td><td>10</td><td>90</td><td>150</td></tr> </tbody> </table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	5	20	30	10	90	150
ECTS credits	Contact hours		ISIS	SIS	Total hours														
	Lectures	Practice sessions																	
5	20	30	10	90	150														

Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)
	1 st attestation	Assignment1	30	Submission of project part (OpenGL file)	1 st week
		Assignment2	30		4 th week
		Mid-term Exam	40	MCQ	5 th week
		1st attestation total	100		
	2nd attestation	Assignment3	30	Submission of project part (OpenGL file)	6 th week
		Assignment4	30		8 th week
		Assignment5	40		10 th week
	2nd attestation total	100			
Final Exam		100	Final Project defense	During final exam session	
Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.					
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Recommended prerequisites	Algorithms and Data Structures, Object Oriented Programming, Introduction to programming (C++)				
Module objectives/intended learning outcomes	By the end of this course students will attain the following learning outcomes. The student will show a working knowledge in: <ul style="list-style-type: none">• Basic computer graphics algorithms;• Mathematics in basis of computer graphics;• Advanced computer graphics algorithms;• Know advanced graphics algorithms Students will have the skill to <ul style="list-style-type: none">• Construct basic programmable pipeline in computer graphics• Write shaders• Work with data transferring to graphic memory• Create graphical applications• Work with virtual light and textures• Understand non-real-time graphics• Create applications using OpenGL;• Write different graphic shaders;• Work with external libraries. In terms of Competences, students will be able to Students by the end of the course will be able to create windowed applications in C++ using OpenGL. Know several algorithms and approaches of visualization. Be able to implement knowledge of the algorithms and hardware usage to other platforms.				
Content	This course covers basic conceptual algorithms used to visualize 3D graphics in media and science. Topics include OpenGL 1.0-1.5, OpenGL 2.0-3.3,				

	Transformation objects in 3D, Skeletal animation principles, 3D textures, non-real time graphics, advanced software rendering and image generating approaches.
Media employed	Multimedia classrooms equipped with computer, projection, and audio system; Whiteboard; Microsoft Teams; LMS Moodle, OpenGL.
Reading list	Basic Literature: https://learnopengl.com/ 2. Kosarevsky S., L.atypov V. 3D Graphics Rendering Cookbook Supplementary literature: . G.Sellers Vulkan Programming Guide: The Official Guide to Learning Vulkan (OpenGL) 1 st Edition S.Marschner, Fundamentals of Computer Graphics 4 th edition

Term 8

Module name:	Philosophy									
Code										
Trimester	8									
Person responsible for the module	Assoc. Prof. Ainur Abdina Assoc. Prof. Gulmira Sheriyazdanova Assoc. Prof. Mariyash Bozzigitova									
Lecturer(s)	Assoc. Prof. Ainur Abdina Assoc. Prof. Gulmira Sheriyazdanova Assoc. Prof. Mariyash Bozzigitova									
Language	English									
Relation to curriculum	Compulsory course for all specialties.									
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>									
Workload of course components	<table><tr><td></td><td>Contact hours</td><td>ISIS</td><td>SIS</td><td>Total hours</td></tr></table>						Contact hours	ISIS	SIS	Total hours
	Contact hours	ISIS	SIS	Total hours						

and credits per trimester	ECTS credits	Lectures	Practice sessions				
	5	30	20	10	90	150	
Course assessment and forms of examination	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)		
	1 st attestation	Individual assignment	30	Submission of glossary	3 rd week		
		Group project	30	Presentation	4 th week		
		Mid-term Exam	40	Quiz	5 th week		
		1 st attestation total	100				
	2 nd attestation	Individual assignment	30	Submission of glossary	8 th week		
		Group project	30	Video	9 th week		
		End-term Exam	40	Quiz	10 th week		
		2 nd attestation total	100				
	Final Exam		100	Quiz	During final exam session		
	Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.						
	Requirements according to the examination regulations	Course and university policies include:					
		Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).					
		Late submissions are not accepted.					
		No cheating, duplication, falsification of data, plagiarism, and crib					
	Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.						

Recommended prerequisites	History, Logic, Ethics, Social science, Self-knowledge
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ol style="list-style-type: none"> 1) Formation of students' philosophical reflection, 2) Development of research abilities 3) Formation of intellectual and creative potential of students 4) Increase basic philosophical analysis skills 5) Develop argumentative skills on conflicting topics; 6) Formation of critical thinking and functional literacy skills. <p>Students will have the skill to</p> <ul style="list-style-type: none"> - ability to understand philosophical theories and concepts; - ability of think critically and enhance problem-solving skills; - ability of carrying out individual works on researching, drafting, writing and editing; - ability to select and use reference materials; - ability of discussing and interpreting different philosophical ideas <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> - have a basic comprehension on characteristics of periods of Eastern and Western Philosophy; - understand the meaning of philosophical terms and categories - express and reasonably argue different opinions on significant philosophical topics.
Content	This course is an introduction to the basic theories and concepts in Philosophy including knowledge of history of Philosophy and the theory of Philosophy, basic philosophical doctrines, terms and categories, and Philosophy of Science.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 1. W. Russ Payne, An Introduction to Philosophy, Bellevue College Press 2015. 2. Johnston D. A. Brief History of Philosophy: from Socrates to Derrida, Bloomsbury Academic, 2011. 3. Russell B. History of Western Philosophy, Touchstone Edition, 1986. 4. Kenny A. A Brief History of Western Philosophy. Oxford University Press, USA, 2010. 5. Masalimova A. R., Altaev Zh.A., Kasabek A. K. Kazakh philosophy. Textbook. - Almaty, 2018.

	Supplementary literature: <ol style="list-style-type: none"> 1. "Love, Order, and Progress : The Science, Philosophy, and Politics of Auguste Comte" ,2018 2. Augustinus, Confessiones, trans. By Henry Chadwick (Oxford World's Classics) 3. Gilles Deleuze & Félix Guattari: 'What is Philosophy?' 4. Immanuel Kant: 'What is enlightenment?' 5. Martin Heidegger: 'What is Philosophy?' trans. by William Kluback 6. Martin Heidegger, The Question Concerning Technology, Garland Publishing, New York, 1977. Jean T Wilde (New Haven, Conn.: College University Press, 1956). 7. Abai Kunanbayev 'Book of Words' 8. Sh. Kudaiberdiulu 'Ush Anyk' 9. Michel Bourdeau, Mary Pickering, arren Schmaus "Love, Order, and Progress : The Science, Philosophy, and Politics of Auguste Comte" ,2018 10. Mariusz Tabaczek.Emergence : Towards A New Metaphysics and Philosophy of Science, 2019 Mariusz Tabaczek 11. Michele Merritt.Minding Dogs : Humans, Canine Companions, and a New Philosophy of Cognitive Science, 2021
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Module name:	Cloud Computing																		
Code																			
Trimester	8																		
Person responsible for the module	Aldiyar Salkenov, Senior Lecturer, Master of Engineering in Information Technology																		
Lecturer(s)	Elvira Aitmukhanbetova, MSc in Computer Science Meruyert Nurgazy, MSc in Software Engineering																		
Language	English																		
Relation to curriculum	Bachelor programmes: Computer Science, Software Engineering																		
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																		
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Course assessment and	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)									
Period	Assessment type	Number of points	Exam Form	Schedule (Week #)															

forms of examination	1 st attestation	Quiz 1	15	Multiple Choice Questions	Week 2
		Quiz 2	15	Multiple Choice Questions	Week 4
		Assignment 1	10	Self-checked laboratory work	Week 2
		Assignment 2	10	Self-checked laboratory work	Week 3
		Assignment 3	10	Self-checked laboratory work	Week 4
		Mid-term Exam	40	Multiple Choice Questions	Week 5
		1st attestation total	100		
	2 nd attestation	Quiz 3	15	Multiple Choice Questions	Week 7
		Quiz 4	15	Multiple Choice Questions	Week 9
		Assignment 4	10	Self-checked laboratory work	Week 6
		Assignment 5	10	Self-checked laboratory work	Week 8
		Assignment 6	10	Self-checked laboratory work	Week 9
		End-term Exam	40	Multiple Choice Questions	Week 10
		2nd attestation total	100		
	Final Exam	Final test	30	Multiple Choice Questions	During final exam session
		Final project	70	A project	During final exam session
		Final total	100		
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100$.				
Requirements according to the examination regulations	Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.				
Recommended prerequisites	Software Architecture, Advanced Programming, DBMS, Computer Organization and Architecture				
Module objectives/intended learning outcomes	Students will show a working knowledge in: <ul style="list-style-type: none"> different types of cloud computing models advantages that cloud computing provides over a traditional, on-premises computing model. the main AWS service categories and core services cloud economics and billing including a pay-as-you-go model, total cost of ownership, AWS organizations and cost management 				

	<ul style="list-style-type: none"> cloud global presence including AWS global infrastructure cloud security and concepts such as shared responsibility model, access management, account security, data security using encryption, and compliance regulations networking concepts such public and private networks, subnets, IPv4 and IPv6 addresses, CIDR notation, internet gateways, and endpoints key concepts of high-level cloud computing including elastic computing, containers, virtual machines and serverless solutions various storage types including block storage, file storage and object storage cloud database services including managed and unmanaged services, relational, non-relational databases cloud architecture design principles and best practices such as scalable, dynamic architectures using traffic distribution and monitoring technologies <p>Students will have the skills to:</p> <ul style="list-style-type: none"> set up AWS accounts, work with provisioning management software and launch instances on Amazon EC2 manage users and user permissions in AWS set up an organizational structure that simplifies billing and account visibility to review cost data create resizable compute capacity in the cloud using Amazon EC2 create a virtual private network and add additional components to produce a customized network mitigate varying loads on the server using Elastic Load Balancing and Auto Scaling at AWS create an Amazon EBS volume, attach it to an instance, apply a file system to the volume, and then take a snapshot backup demonstrate when to use AWS Database services including Amazon Relational Database Service (RDS), Amazon DynamoDB, Amazon Redshift, and Amazon Aurora <p>In terms of competences, students will be able to:</p> <ul style="list-style-type: none"> explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, et demonstrate a solid understanding of what AWS is, what its many services are all about (and what each service does) and which kind of service (or service combination) may be used to implement meet IT or application requirements build IT solutions using cloud technologies by implementing computing, storage, database, networking and management services
Content	<p>This course provides a hands-on comprehensive study of cloud concepts and capabilities across the various cloud service models including Software as a Service (SaaS), Infrastructure as a Service (IaaS) and Platform as a Service (PaaS). Cloud computing is introduced through Amazon Web Services (AWS) and its capabilities. Through a combination of presentations, demos, and hands-on labs, students get an overview of AWS and a detailed view of the computing and storage capabilities. Additionally, this course showcases the ease, flexibility, and power of serverless solutions on AWS.</p>
Media employed	<p>Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle; AWS Learning Academy</p>
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, ISBN 978-0470887998, 2011

	<p>2. Amazon Web Services in Action, Andreas Wittig, Michael Wittig, Manning Publications Co., ISBN 978-1617292880, 2016</p> <p>Supplementary literature:</p> <p>1. Learn AWS Serverless Computing, Scott Patterson, Packt Publishing, ISBN 978-1789958355, 2019</p>
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Module name:	Project Management																						
Code																							
Trimester	8																						
Person responsible for the module	Associate professor N. Ibadildin, PhD																						
Lecturer(s)	Associate professor N. Ibadildin, PhD																						
Language	English																						
Relation to curriculum	Bachelor programmes: IT Management, IT Entrepreneurship Compulsory course.																						
Type of teaching	<p>Lectures serve to present new ideas and give theoretical and methodological groundwork (case analysis, problem solving, real case applications).</p> <p>Practice sessions (seminars) are interactive sessions designed to develop firm understanding of its accounting and financial perspectives. Based on the use of active teaching methods like case studies, problem solving and business cases through interactive discussions, MCQ's and analytic problem-solving students are urged to properly prepare and actively participate.</p> <p>Instructor-supervised independent study (ISIS) is to explore and investigate course content in greater detail (discussion).</p> <p>Student's independent study (SIS): self-study time, including preparation and completion of all course examinations.</p>																						
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>4</td><td>20</td><td>20</td><td>10</td><td>70</td><td>120</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	4	20	20	10	70	120				
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Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td rowspan="3">1st attestation</td><td>Individual written assignment 1</td><td>30</td><td>Written</td><td>2^d week</td></tr><tr><td>Test assignment 2</td><td>20</td><td>MCQ</td><td>3^d week</td></tr><tr><td>Team project assignment 3</td><td>50</td><td>Report and Presentation</td><td>4th week</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Individual written assignment 1	30	Written	2 ^d week	Test assignment 2	20	MCQ	3 ^d week	Team project assignment 3	50	Report and Presentation	4 th week
Period	Assessment type	Number of points	Exam Form	Schedule (Week #)																			
1 st attestation	Individual written assignment 1	30	Written	2 ^d week																			
	Test assignment 2	20	MCQ	3 ^d week																			
	Team project assignment 3	50	Report and Presentation	4 th week																			

		1st attestation total	100		
	2nd attestation	Individual written assignment 4	20		7 th week
		Test assignment 5	20		8 th week
		Team project assignment 6	30		9 th week
		Attendance	30		
		2nd attestation total	100		
	Final Exam		100	Written exam	During final exam session
	Cumulative total for the course = $0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final} = 100$.				
Requirements according to the examination regulations	<p>Course and university policies include: Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school). Late submissions are not accepted. No cheating, duplication, falsification of data, plagiarism, and crib Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>				
Recommended prerequisites	Business Administration				
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • Modern project management fundamentals; • Principles of project management. <p>Students will have the skill to</p> <ul style="list-style-type: none"> • Analyze projects through different methodologies based on the project's results and make decisions as a project manager. • Understand project's documents from manager's point of view • Project management literacy; • Reading and producing project's documents; • Planning; • Teamwork; • Decision making; • Communication; • Leadership; • Work ethics; • Problem solving; • Organizational skills. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • Understand project management fundamentals through reading textbook and lecturing on course topics. • Communicate effectively on project management. 				

	<ul style="list-style-type: none"> • Apply work breakdown structures (WBS) for the project. • Employ necessary network scheduling techniques. • Create a project management plan. • Implement a developed project management plan. • Advance in concepts that will assist the student in his/her development academically, ethically, analytically, and develop as a project manager.
Content	<p>Project management course will concentrate on the lifecycle of the project from the project manager's position. Students will understand the company's decision-making processes from the inception of the project and acquire knowledge of how to start and control new and existing projects. Main topics will include project integration, project scope management, project time and cost management, quality management, human resource considerations, communications, risk management, and procurement management. Undergraduates will learn how a company will initiate, plan, execute, monitor and close projects under certain restrictions including scope, timeline, budget and resources.</p>
Media employed	<p>Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.</p>
Reading list	<p>Basic Literature:</p> <ol style="list-style-type: none"> 4. A Systems Approach to Planning, Scheduling, and Controlling, 12th ed. Harold Kerzner, ISBN-10: 9781119165354, ISBN-13: 978-1119165354, 2017 5. Project Management Case Studies 5th Edition, Harold Kerzner, ISBN-10: 1119385970, ISBN-13: 978-1119385974, 2017 6. A Guide to the Project Management Body of Knowledge (PMBOK® Guide)–Sixth Edition, Project Management Institute, ISBN-10: 9781628251845, ISBN-13: 978-1628251845, 2017 7. Agile Practice Guide 1st Edition, Project Management Institute, Inc., ISBN: 978-1-62825-199-9, 2017 8. PMP Exam Prep, What You Really Need to Know to Pass the Exam Tenth Edition, Upgraded, Rita Mulcahy, ISBN-10: 1943704279, ISBN-13: 978-1943704279, 2022 9. PMI-ACP Exam Prep: A Course in a Book for Passing the PMI Agile Certified Practitioner (PMI-ACP) Exam (Updated Second Edition). Mike Griffith, ISBN-10: 1932735984, ISBN-13: 978-1932735987, 2018 <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. Successful Project Management 7th Edition, Cengage Learning, ISBN-10: 1337095478, ISBN-13: 978-1337095471, 2017 2. Contemporary Project Management 4th Edition, Timothy Kloppenborg, Vittal S. Anantatmula, Kathryn Wells, Cengage Learning, ISBN-10: 9781337406451, ISBN-13: 978-1337406451, 2018 3. Information Technology Project Management 9th Edition, Kathy Schwalbe, Cengage Learning, ISBN-10: 9781337101356, ISBN-13: 978-1337101356, 2018 4. Girvan L., Paul D. Agile and Business Analysis: Practical Guidance for IT Professionals. BCS, The Chartered Institute for IT; 2017. Accessed November 24, 2022. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1426600&lang=ru&site=ehost-live

Module name:	Research Methods and Tools																																													
Code																																														
Trimester	8																																													
Person responsible for the module	Senior Lecturer R. Omirgaliyev, MSc																																													
Lecturer(s)	A. Salkenov, MSc																																													
Language	English																																													
Relation to curriculum	Bachelor programmes: Software Engineering, Computer Science. Compulsory course.																																													
Type of teaching	<p>Lectures serve to introduce new concepts and provide theoretical and methodological foundations.</p> <p>Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems.</p> <p>Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material.</p> <p>Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.</p>																																													
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	2nd attestation total	100																																												
Final Exam Project		100	Manuscript and oral presentation	During final exam session																																										
Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.																																														

Requirements according to the examination regulations	<p>Course and university policies include:</p> <p>Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).</p> <p>Late submissions are not accepted.</p> <p>No cheating, duplication, falsification of data, plagiarism, and crib</p> <p>Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>
Recommended prerequisites	Academic Writing.
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • Describe the paradigms that drive research; • Navigate in research processes and conduct valuable research projects • Explore different ways to do research, and gain an understanding of qualitative, quantitative, and mixed-methods research • Bring the gained knowledge and skills into action for diploma works <p>Students will have the skill to</p> <ul style="list-style-type: none"> • Analyze a big number of Literature Resources; • Define narrow research field; • Generate Research Question(s); • Writing Research Proposal for Chosen Research Field. • Identify Differences between qualitative and quantitative methodologies. • Use different tools for citation, for analyzing survey and future statistics. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • Critically evaluate the data and information; • Have a good communication among group members. • Have a problem-solving competence for solving different kind of problems; • Interpret the results of surveys (questionnaires) to some meaningful report and conclusion.
Content	This course covers various concepts crucial to scientific research methodology, from the initial formulation of the problem through all the steps designing and conducting the research to the final stage of writing a report.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Basic Literature:</p> <p>5. The Essential Guide to Doing Your Research Project, 3rd edition, Zina O'Leary, SAGE Publications Ltd, 2017, ISBN-13: 978-1473952089</p> <p>Supplementary literature:</p> <p>16. Research Methodology: Tools and Techniques, 1st edition, Dr. Prabhat Pandey, Bridge Center, 2015, ISBN-13: 976-6069350270</p>

Module name:	Distributing Computing																																																					
Code																																																						
Trimester	8																																																					
Person responsible for the module	Shchuking Georgiy																																																					
Lecturer(s)	Shchuking Georgiy, M.Sc., Russia																																																					
Language	English																																																					
Relation to curriculum	Bachelor programmes: Software Engineering, Computer Science Elective																																																					
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.																																																					
Workload of course components and credits per trimester	<table><tr><td rowspan="2">ECTS credits</td><td colspan="2">Contact hours</td><td rowspan="2">ISIS</td><td rowspan="2">SIS</td><td rowspan="2">Total hours</td></tr><tr><td>Lectures</td><td>Practice sessions</td></tr><tr><td>5</td><td>30</td><td>20</td><td>10</td><td>90</td><td>150</td></tr></table>					ECTS credits	Contact hours		ISIS	SIS	Total hours	Lectures	Practice sessions	5	30	20	10	90	150																																			
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Course assessment and forms of examination	<table><tr><td>Period</td><td>Assessment type</td><td>Number of points</td><td>Exam Form</td><td>Schedule (Week #)</td></tr><tr><td rowspan="4">1st attestation</td><td>Problem Sets</td><td>30</td><td>Submission of written reports</td><td>Weekly</td></tr><tr><td>Quiz</td><td>30</td><td>Written</td><td>3rd week</td></tr><tr><td>Mid-term Exam</td><td>40</td><td>Written</td><td>5th week</td></tr><tr><td>1st attestation total</td><td>100</td><td></td><td></td></tr><tr><td rowspan="4">2nd attestation</td><td>Problem Sets</td><td>30</td><td>Submission of written reports</td><td>Weekly</td></tr><tr><td>Quiz</td><td>30</td><td>Written</td><td>8th week</td></tr><tr><td>End-term Exam</td><td>40</td><td>Written</td><td>10th week</td></tr><tr><td>2nd attestation total</td><td>100</td><td></td><td></td></tr><tr><td colspan="2">Final Exam</td><td>100</td><td>Written</td><td>During final exam session</td></tr><tr><td colspan="5">Cumulative total for the course = 0,3 * 1st Att + 0,3 * 2nd Att + 0,4*Final = 100.</td></tr></table>					Period	Assessment type	Number of points	Exam Form	Schedule (Week #)	1 st attestation	Problem Sets	30	Submission of written reports	Weekly	Quiz	30	Written	3 rd week	Mid-term Exam	40	Written	5 th week	1st attestation total	100			2nd attestation	Problem Sets	30	Submission of written reports	Weekly	Quiz	30	Written	8 th week	End-term Exam	40	Written	10 th week	2nd attestation total	100			Final Exam		100	Written	During final exam session	Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.				
Period	Assessment type	Number of points	Exam Form	Schedule (Week #)																																																		
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Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.																																																						

Requirements according to the examination regulations	The exam will take the form of a test. The test consists of 20 questions. The allocated time for the test is 40 minutes.
Recommended prerequisites	Introduction to Programming, Computer Organization and Architecture
Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • principles, algorithms, and tools used for distributed computing systems. • key concepts such as concurrency, synchronisation, and distributed transactions. • different distributed computing models, such as client-server, peer-to-peer, and cloud computing. • architectural and design patterns in distributed systems. • different types of network protocols and communication mechanisms in distributed systems. • security, privacy, and ethical issues in distributed systems. <p>Students will have the skills to</p> <ul style="list-style-type: none"> • to design, implement, and evaluate a distributed system to meet desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, and sustainability. • to use modern tools necessary for distributed computing practices. • to effectively use concurrency and synchronisation in distributed systems. • To identify, formulate, and solve distributed computing problems. • Skill in the configuration, administration, and troubleshooting of distributed systems. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • effectively work in a team to accomplish a common goal related to distributed computing. • self-directed learn, understanding when additional information or skills are needed, and able to locate, use, and critically evaluate that information. • communicate effectively about distributed systems concepts, designs, and decisions to both technical and non-technical stakeholders. • engage in continuing professional development in the field of distributed computing, to cope with rapid technological changes. • Understand and apply professional, ethical, and legal responsibilities in distributed computing scenarios. • recognize the social, legal, and cultural issues involved in the deployment and use of distributed systems, and apply this understanding for ethical decision-making.
Content	<p>The primary purpose of this discipline is to impart knowledge about distributed systems, their components, and how they interact. This includes learning about various distributed computing models such as client-server, peer-to-peer, and cloud computing.</p> <p>Students learn the practical aspects of designing and building distributed systems. This includes understanding how to manage complexity, handle concurrent processing, ensure security and privacy, and manage resources effectively.</p>
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	Basic Literature:

	1. Parallel and Distributed Computing Handbook 1st Edition by Albert Y. Zomaya, 1995, 1232 p 2. Ajay D. Kshemkalyani Mukesh Singhal Distributed Computing: Principles, Algorithms, and Systems, 2011 Supplementary sources: https://www.tutorialspoint.com/Distributed-Systems https://www.baeldung.com/cs/distributed-systems-guide https://www.geeksforgeeks.org/distributed-systems-tutorial/
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Module name:	Information Security Fundamentals									
Code										
Trimester	8									
Person responsible for the module	Assoc. Prof. M Sarinova Asiya Zhumabaevna PhD									
Lecturer(s)	Otarbay Zhenis PhD candidate in Robotics Kulbaeva Laura MSc in Information systems Aldosh Balziya MSc Kutubaeva Madina MSc									
Language	English									
Relation to curriculum	Bachelor programmes: Big Data Analysis, Software Engineering, IT Management. Compulsory course.									
Type of teaching	Lectures serve to introduce new concepts and provide theoretical and methodological foundations. Practice sessions (seminars) are active sessions to develop student’s confidence through new examples and discussions on the problems. Instructor-supervised independent study (ISIS) deals with review and exploration in greater depth of the course material. Student’s independent study (SIS): Self-study time including the time required to prepare for and complete all course assessments.									
Workload of course components	<table><tr><td></td><td>Contact hours</td><td>ISIS</td><td>SIS</td><td>Total hours</td></tr></table>						Contact hours	ISIS	SIS	Total hours
	Contact hours	ISIS	SIS	Total hours						

and credits per trimester	ECTS credits	Lectures	Practice sessions				
	5	30	20	10	90	150	
Course assessment and forms of examination							
	Period	Assessment type	Number of points	Exam Form	Schedule (Week #)		
	1 st attestation	Problem Sets	30	Submission of written reports	Weekly		
		Quiz	30	Written	3 rd week		
		Mid-term Exam	40	Written	5 th week		
		1 st attestation total	100				
	2nd attestation	Problem Sets	30	Submission of written reports	Weekly		
		Quiz	30	Written	8 th week		
		End-term Exam	40	Written	10 th week		
		2 nd attestation total	100				
	Final Exam		100	Written	During final exam session		
	Cumulative total for the course = 0,3 * 1 st Att + 0,3 * 2 nd Att + 0,4*Final = 100.						
	Requirements according to the examination regulations	Course and university policies include:					
		Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).					
		Late submissions are not accepted.					
	No cheating, duplication, falsification of data, plagiarism, and crib						

	Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.
Recommended prerequisites	Information communication technologies, Introduction to Programming 2, Object-Oriented Programming, Programming in C++, Advanced Programming, Computer Organization and Architecture
Module objectives/intended learning outcomes	<p>Students will show a working knowledge in:</p> <ul style="list-style-type: none"> - definition and basic information and static characteristics of language systems; - mathematical representation of secret systems; - methods of text analysis and determination of their redundancy; - methods of constructing transformation systems of information and static characteristics texts; - practical ways to build information security systems; <p>Internet security, managerial concerns, and cryptography techniques.- study and mastering:</p> <ul style="list-style-type: none"> - sources and forms of attacks on information; - security models (including major operating systems); - types of malware; - cryptographic and administrative methods of protection; <p>- administration of corporate and local networks, methods of protection of networks and protocols;</p> <p>Students will have the skills to: Recognize the fundamentals of computer networking Recognize fundamental cryptography Recognize several password-cracking techniques.</p> <p>In terms of competences, students will be able to:</p> <ul style="list-style-type: none"> - analyze texts and determine their redundancy; - develop systems for the transformation of information and statistical characteristics texts; - develop information security systems; - to select and apply methods of information protection; - select and apply information security tools.
Content	The purpose of Information Security Fundamentals is to provide students with a basic understanding of information security. We take a high-level overview of subjects including risk management, security policies, fundamental networking, password cracking, cryptography, malware, mobile security, and more. From there, the student will be able to comprehend the value of data protection as well as the usual procedures and guidelines followed by information security professionals. Students will next get an overview of a variety of offensive security subjects, including as malware,

	password cracking, sniffer, and more! The student will be exposed to both offensive and defensive themes to help them select areas of interest. This is excellent for students leaving IT roles or those looking to make a complete career move.
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.
Reading list	<p>Assigned reading materials and presentations should be read prior to class. All necessary updates and / or changes to the course will be reflected in the Learning Management System (moodle.astanait.edu.kz).</p> <p>Basic Literature:</p> <ol style="list-style-type: none"> 1. Library of Congress Control Number: 2010940654 ISBN-13: 978-1-111-13821-9 ISBN-10: 1-111-13821-4. No Starch Press, Inc. 245 8th Street, San Francisco, CA 94103 phone: 1.415.863.9900; info@nostarch.com www.nostarch.com 2. Principles of Information Security Fourth Edition. Michael E. Whitman, Ph.D., CISM, CISSP Herbert J. Mattord, CISM, CISSP Kennesaw State University. Library of Congress Control Number: 2010940654 ISBN-13: 978-1-111-13821-9 ISBN-10: 1-111-13821 3. Brooks, C. J., Grow, C., Craig Jr, P. A., & Short, D. (2018). Cybersecurity essentials. John Wiley & Sons. 4. Principles of Information Security 6th Edition, 2017 5. Advanced Cybersecurity Technologies 1st Edition, 2021 6. Fundamentals of Information Security Risk Management Auditing : An introduction for managers and auditors, Wright, Christopher 7. CISSP® Certified Information Systems Security Professional Official Study Guide Eighth Edition. John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, or online at http://www.wiley.com/go/permissions. <p>Supplementary literature:</p> <ol style="list-style-type: none"> 1. Fundamentals of Information Systems Security, 3rd Edition, by David Kim, Michael G. Solomon. <p>Asylbekov U.B. Cybersecurity: Protection in the Digital World= Кибербезопасность: защита в цифровом мире : textbook = учебное пособие / U.B. Asylbekov, A.A. Ismailova. - Pt. 1 = 1 Ч. - Almaty : Bastau, 2021. - 344 p. - ISBN 978-601-7660-06-02 : 14380.00. 32.973 - A89</p>

Module name:	IT Risk Management
Semester(s) in which the module is taught	8
Person responsible for the module	Madina Tulemissova, Senior-lecturer
Language	English

Relation to curriculum	Elective							
Teaching methods	Lecture, class discussions, group project, individual assignments, case-study, quiz							
Workload (incl. contact hours, self-study hours)	ECTS credits	Contact hours		ISIS	SIS	Total hours		
		Lectures	Practice sessions					
	5	20	30	10	90	150		
Credit points	5							
Requirements according to the examination regulations	<p>Course and university policies include:</p> <p>Attendance is mandatory. Missing 30% of lessons will result in F (Fail) grade (or summer school).</p> <p>Late submissions are not accepted.</p> <p>No cheating, duplication, falsification of data, plagiarism, and crib</p> <p>Contacting the Lecturer: students are welcome to arrange one-to-one meetings with the teacher during office hours to discuss the class.</p>							
Required and recommended prerequisites for joining the module	Management, Project Management, IT Operations Management							

Module objectives/intended learning outcomes	<p>By the end of this course students will attain the following learning outcomes.</p> <p>The student will show a working knowledge in:</p> <ul style="list-style-type: none"> • The fundamentals of risk management • Risk Identification • Risk assessment • Risk response • Risk monitoring and reviewing <p>Students will have the skill to</p> <ul style="list-style-type: none"> • define risk management • recognize why it's important to set the context and objectives for the risk management process • recognize why it's necessary to apply a risk management process in a project, and • summarize and classify each step of the risk management • identify risks in achieving objective outcomes • identify categories of risk, and • select methods to identify risks. • recognize the process of undertaking a risk assessment of identified risks • select risk controls through risk assessment • use a risk matrix to respond to identified risks • clarify risks to stakeholders • use contingencies to deal with risk • identify methods of treating risk • design a Communications Plan to include all stakeholders in the management of identified and assessed risks, and • design a Risk Management Plan. • recognize the importance of a monitor and review process • use a monitor and review process • integrate a monitor and review process that sets targets • obtain and use feedback for continuous improvement, and • select steps for continuous improvement. <p>In terms of Competences, students will be able to</p> <ul style="list-style-type: none"> • know how the risk management process works as part of a compliance framework • use frameworks to identify, assess and analyze risks in a business context • apply appropriate risk responses • design and integrate strategies for reporting and communicating risks to various stakeholders • use a monitor and review process, and apply risk management as an iterative process.
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Content	The course covers the area of risk management in the context of a project. It highlights the importance of risk management and the need for project managers to think about it in advance. The course contains basic risk management theories and concepts applicable to the project environment, including planning, preparing and responding to project risks. The course covers the areas of risk identification, assessment, monitoring and control. As part of this course, students will be introduced to methods of qualitative and quantitative risk analysis.				
Exams and assessment formats	Period	Assignments	Number of points	Total Weights	
	Midterm	Individual assignments	60	30%	
		Midterm quiz	40		
	Endterm	Individual assignments	10	30%	
		Group project: Risk Management Plan	10		
		Risk Identification (Risk Register)	20		
		Qualitative Risk Analysis (Matrix)	20		
Risk Response Plan		20			
Endterm assessment (Presentation)		20			
Final Exam	Case study exam	100	40%		
	Total	0,3 * Midterm + 0,3 * Endterm + 0,4 * Final Exam			
Media employed	Multimedia classrooms equipped with computer, projection and audio system; Whiteboard; Microsoft Teams; LMS Moodle.				
Reading list	<ul style="list-style-type: none">• Mulcahy, Rita (2019): Risk Management, 3rd edition, Rmc Pubns Inc.• Pandian, C. Ravindranath (2006): Applied Software Risk Management: A Guide for Software Project Managers 1st Edition• International Project Management Association IPMA (2015): Individual Competence Baseline 4th version (ICB4)• ISO (2012): ISO 21500 - Guidance on project management.• Project Management Institute (2017): A guide to the project management body of knowledge (PMBOK guide) Sixth edition; Agile practice guide. Newtown Square, PA• J. Hermarij, Better Practices of Project Management (2016), 4th fully revised edition. Based on IPMA Competences - ICB Version 4				

Reading list	<p>Assigned reading materials and presentations should be read prior to class. Class lectures and discussions will proceed with supplemental and advanced topics, which could be difficult to understand unless students have read the assigned material. Readings are listed in the schedule section. All necessary updates and / or changes to the course will be reflected in the Learning Management System (moodle.astanait.edu.kz).</p> <p>Basic Literature:</p> <ol style="list-style-type: none"> 2. Eric Ries. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses Crown Business, 2011, ISBN-13: 978-0307887894 3. 2. Alexander Osterwalder & Yves Pigneur Business Model Generation/ An amazing crowd of 470 practitioners from 45 countries\Copyright © 2010 by Alexander Osterwalder. All rights reserved. Published by John Wiley & Sons, Inc., Hoboken, New Jersey. Published simultaneously in Canada. ISBN: 978-0470-87641-1 Printed in the United States of America 2018 <p>Supplementary literature:</p> <ol style="list-style-type: none"> 4. Ash Maurya. Running Lean: Iterate from Plan A to a Plan That Works (Lean (O'Reilly)) 2nd O'Reilly Media; 2nd edition (March 20, 2012) ISBN-13: 978-1449305178. 5. Rob Fitzpatrick. The Mom Test: How to talk to customers & learn if your business is a good idea when everyone is lying to you. CreateSpace Independent Publishing Platform; 1st edition (September 10, 2013), ISBN-13: 978-1492180746. 6. Ian Chaston (2017). Technology Entrepreneurship. Technology- driven vs market-driven entrepreneurship; 7. Tony Bailetti (2012). Technology Entrepreneurship: Overview, Definition and distinctive aspects; Ian Chaston (2017). Technology Entrepreneurship. Technology-driven vs market-driven entrepreneurship; 8. Richard Florida and Martin Kenney (1988) Venture capital and high technology entrepreneurship. Journal of Business Venturing; 9. Ross Brown and Collin Mason (2014) Inside the high-tech black box: A critique of technology entrepreneurship policy;
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